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Analysing of players' perceptions on game aesthetics

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Game aesthetics is a crucial multidimensional concept in understanding player experience within the gaming industry. However, limited empirical research has examined how players perceive game aesthetics and to what extent these perceptions vary among different player groups. To address this gap, this study employed a quantitative approach to identify the measures and the key dimensions of game aesthetics in Action Role-Playing Games (ARPGs), adopting the Mechanics–Dynamics–Aesthetics (MDA) framework to assess players' perceptions of game aesthetics. A survey was conducted with 462 valid respondents who had prior experience playing ARPGs. The results demonstrated that the "Aesthesis" dimension was perceived as the most important aspect of game aesthetics, followed by "Story," "Venture," and "Connection." These results indicate that visual and auditory design, narrative content, gameplay structure, and social interaction are key factors influencing players' aesthetic experiences. Furthermore, ARPG Players with different educational backgrounds, game experiences, monthly game expenses, and playtime may perceive game aesthetics differently. Players' perceptions of game aesthetics were also found to influence their acceptance of games, which subsequently affects their willingness to purchase or recommend them to others.

KEYWORDS

game aesthetics, MDA approach, game players' perception, game acceptance, action role-playing game

1 Introduction

Video game user experience evaluation has increasingly gained attention (Bernhaupt, 2015), and interest has grown in both academia and the video game industry (Williams et al., 2021). Player satisfaction and experience directly influence their loyalty to games. By providing unique and player-expectation-matching game experiences and understanding players' psychological, emotional, and social needs, game companies can design more creative games, attract more players, and increase market share. Game aesthetics may influence players' game engagement and retention (Chen et al., 2024). The importance of game aesthetics not only lies in commercial success but also in shaping the social and cultural impact of digital entertainment. Therefore, exploring players' perceptions of game aesthetics is valuable.

A review of previous studies shows that most research has utilised qualitative approaches, such as case studies or conceptual models, to analyse game aesthetics (Abubakar et al., 2016; Martyastiadi et al., 2019; Jafarkhani et al., 2024), which lacked empirical analysis to establish the model of game aesthetics based on players' perceptions. This research aimed to fill the gap. Therefore, this research employed the mechanics, dynamics, and aesthetics (MDA) approach to evaluate the factors of the game aesthetics based on players' experiences and perceptions of games, aimed to compare the differences in game aesthetics among players with different demographic backgrounds and to investigate whether there is a correlation between the intensity of players' perception of game aesthetics and their game acceptance.

2 Literature review

2.1 Definition of game aesthetics

Aesthetics analyses and appreciates the beauty in artworks through the practise of aesthetic ability, serving as the reception terminal for "emotion and sensation" information. Game aesthetics, as a branch of aesthetic research and an academic issue, have attracted the attention of many researchers, but the literature on game aesthetics is vast (Sicart, 2023). For example, Abubakar et al. (2016) included the elements of text, image, visual perspective, music, sound effect, voice, colour, graphic, layout, shape, and form in the definitions of game aesthetics. However, more recent research about game aesthetics is concerned with game players' experiences and social dynamics. This research aims to combine various aspects of game design, game experience, and dynamics among game players to understand game aesthetics.

Niedenthal (2009) pointed out that game aesthetics is a special experience with multiple centres involving senses, art, and "aesthetic experience." Some consider game aesthetics as one of the terms used to describe the various experiences of games (Calvillo-Gámez et al., 2015). Game aesthetics deal with the general pleasure that players feel due to interacting with the game (Fencott et al., 2012: pp. 45–60). Aesthetics describe the emotional responses that players expect when interacting with game systems (Hunicke et al., 2004). Previous literature has gradually transitioned from a single-dimensional understanding of game aesthetics to a multidimensional cognition. Game aesthetics have an interdisciplinary nature, covering aspects such as sensation, art, literary narrative, aesthetic experience, etc. It is a term that describes the comprehensive experience of players interacting with games, focusing not only on the aesthetic sensations of graphics and design but also on how to evoke emotional resonance among players through game mechanics, plot development, and interactive design and narrative (Revi et al., 2020). Game aesthetics showcase elements including audio and visual, rules, geography, temporal features, and the number of players, and how these are integrated to create the game experience (Egenfeldt-Nielsen et al., 2020: pp. 121–155). Hence, it is a subjective relationship between users and video games (Bernhaupt, 2015). Loyola et al. (2024) addressed that game aesthetics motivate players, making them decide to play the game and attracting them to return and engage in it again.

Suh et al. (2015) pointed out that game aesthetics come from game dynamics that stimulate users to leave their marks, compete with others, purchase game items, upgrade levels and create unique characters. Beyond attracting players, game aesthetics create a new, believable world that players can fully inhabit, so leveraging the potential of visual and emotional game design not only increases players' understanding of game mechanics but also contributes to an artistic expression of the gaming experience (Jafarkhani et al., 2024). Moreover, Possler and Klimmt (2023) applied a media psychological model to demonstrate that game aesthetics facilitate players' entertainment experience.

To summarise the elements of game aesthetics, visual aspects, such as graphics, images, icons, colours, layouts, and text; and auditory aspects, such as sound effects, music, and voice, were included in many articles (Hunicke et al., 2004; Niedenthal, 2009; Abubakar et al., 2016; Egenfeldt-Nielsen et al., 2020: pp. 121–155; Abu Baker and Bahrin, 2024). These elements could be important in the structure of the game's aesthetics. Therefore, Hypothesis 1 of this research is stated: among the factors of game aesthetics, sensory experiences, such as visual, auditory and tactile, are weighted as the most important values.

Moreover, the study of game aesthetics has gradually become an interdisciplinary field, attracting the joint attention of psychologists, designers, computer scientists, and cultural researchers. Through in-depth research on game aesthetics, we can better understand the essence of player interaction with games and reveal how games influence social culture, shape emotional thought patterns, and become the intersection of entertainment and art. Hence, this research will explore other factors in the dimensions of game aesthetics and examine how they affect game players' acceptance.

2.1.1 The theoretical framework of game aesthetics

The game designer and academic researcher Gonzalo Frasca first introduced the term "game aesthetics" in his paper "Ludology meets narratology: The Differences and Similarities between Games and Narrative (Video)." Ludology focuses more on the study of video games themselves and suggests the establishment of an independent theory of video games to research the aesthetic categories, definitions, culture, design, and phenomena of games (Frasca, 1999). In 2007, at the DIGRA international conference, a prominent statement was proposed to describe the comprehensiveness and complexity of games: games are an "aesthetic, social, and technological phenomenon." This statement now constitutes common knowledge about games.

Niedenthal (2009) proposed three core meanings of game aesthetics, including (1) Sensory Phenomena: game aesthetics involve the sensory experiences encountered by players in games, such as visual, auditory, tactile, etc.; (2) Artistic Sharing: game aesthetics focus on the aspects of digital games shared with other art forms, such as form, objectives, content, etc.; and (3) Aesthetic Experience: game aesthetics express games as experiences of pleasure, emotion, social interaction, and shaping. In addition to Niedenthal's three core concepts of game aesthetics, Hunicke et al. (2004) also proposed their classification system for game aesthetics and provided a framework to describe and analyse aesthetic elements regarding game experiences. They presented the mechanics, dynamics, and aesthetics (MDA) model as an approach to understanding games, as well as a bridge to the gap between game design and development, game criticism, and technical game research. They provided at least eight dimensions for evaluating game aesthetics, including (1) sensation, which indicates games as sense-pleasure; (2) fantasy, which indicates games as make-believe; (3) narrative, which indicates that games are drama; (4) challenge, which indicates games as obstacle courses; (5) fellowship, which indicates games as a social framework; (6) discovery, which indicates games as uncharted territory; (7) expression, which indicates games as self-discovery; and (8) submission, which indicates games as pastime. They used several genres of games, such as Charades, Quake, The Sims, and Final Fantasy, to examine the eight dimensions. The results showed that the framework they developed was able to cover different genres of game aesthetics.

Hunicke et al. (2004) also employed the three main characteristics of games—mechanics, dynamics, and aesthetics (MDA) approaches—to explain the eight dimensions of game aesthetics. They pointed out that mechanics are various actions, behaviours, and control mechanisms to attract game players in the game context, and the

mechanics support gameplay dynamics by using "narrative," "challenge," "discovery," "expression," and "fantasy." Regarding the characteristics of dynamics, they addressed that dynamics work to create an aesthetic experience; for instance, the dimension of "challenge" is to create pressure and opponents for game players in games. They gave another example concerning the dimension of "fellowship," stating that game players share information across certain members of a session or playing winning conditions and establish their connections or fellowships. These attractions may become a kind of dynamic for these game players. About aesthetics, they mentioned it is not only "sensation" but also concerned with the psychological conditions of the game players—winning and defeating—which support gameplay mechanics and dynamics. Zagal and Tomuro (2010) used a linguistic approach to explore the game players' perceptions of game aesthetics. They found several clusters of adjective vocabularies, such as pacing, complexity, cognitive accessibility, scope, demand, etc. However, the results only showed how game players described gameplay and were missing some important game elements such as story, character, controls, etc. Similarly, Abu Baker and Bahrin (2024) used the attributes of image/graphics, layout, colour, text, shape, form, visual perspective, texture, music, sound effects, and voice to describe game aesthetics; these aesthetic elements focused only on visual-audio aspects and lacked online characteristics, such as interactive and social functions. Kaye (2021) reviewed the literature related to social gaming and found that many studies assumed that the social aspect of gaming is a key motivator for many players, can offer a platform for socialisation, and can result in a more enjoyable or enhanced experience. Wang et al. (2025) pointed out that digital gaming can be a highly social activity; video games thrive on game player's shared experiences, and the social aspect of gaming is central to its widespread appeal and cultural impact. As a result, the social element should be included to evaluate game aesthetics. As Bateman (2015) addressed, there is unity between games and art because they both satisfy fundamental human needs, and these needs have a structural nature. This means that game aesthetics are not only about the rules and mechanics within games but also connected to broader cultural and artistic practises of humanity. Therefore, this research employed broader concepts based on Hunicke et al.'s framework to examine the factors of game aesthetics.

2.1.2 Through MDA approach study game aesthetics

Although Hunicke et al. established the framework for measuring game aesthetics in 2004, the following studies still employed the MDA approach in their game research. For example, Wang et al. (2014) studied game players' acceptance of games based on an aesthetic perspective and used the MDA model to examine the factors. Cardona-Rivera et al. (2020) addressed that GFI parallels MDA as a formal approach that bridges the gap between narrative design, game development, story analysis, and game research. They analysed the shortcomings of the MDA approach and provided the model of GFI, i.e., goals, feedback, and interpretation. Junior and Silva (2021) proposed redefining the MDA taxonomy to provide a better approach from a game designer's perspective, to embrace the design properties of the domain, and solve some issues related to the game domain. Chen (2022) analysed the MDA approach and found a misconception that has been spread among students and game designers. He suggested game educators need to target the misconception to elaborate on these preconceived biases. Wang (2023) conducted a case study and adopted the MDA approach to analyse the intellectual property legal nature of the gameplay and game rules. Sicart (2023) indicates that the beauty of games is related to the performance of game players during their gameplay. The practise of mechanics, such as rules and narratives framed by games, is the source of aesthetic experience. To generalise the common similarity of the research mentioned above, these studies adopted the MDA approach and employed qualitative analysis to study their topics.

In terms of empirical research, for instance, Putra (2021) employed the MDA approach to examine the virtual aesthetics of the Dreadeye VR Game. Yang et al. (2022) adopted the MDA approach and used mixed methodologies to develop a therapeutic video game.

However, reviewing previous studies in the area of game aesthetics and the MDA approach, there was little empirical research but more discussions on game aesthetics. Most of them focus more on theoretical explorations of game design, with relatively few studies on how actual players perceive game aesthetic elements. There is also a lack of empirical research on players' perceptions and responses to aesthetic elements in games. Therefore, this research will adopt a quantitative research method and use the MDA approach to examine game aesthetics and understand players' game experiences.

2.2 Players' background and game aesthetics

Previous research found that there are some relationships between demographics and game aesthetics, such as game players' education level having different perceptions of game aesthetics. Jylha and Hamari (2022) demonstrate that demographic factors have relatively little effect on how incongruities are perceived, with experienced players, younger audiences, and women being more critical in their perceptions of aesthetic excellence. The results are similar to those of Gonzalez-Gonzalez et al. (2022). They found that players' gender and age have different preferences regarding game elements and platforms. Scidone et al. (2024) pointed out that in the digital landscape, gender dynamics are increasingly scrutinised. The research above addresses that some aspects of demographic backgrounds, such as education level, age, and gender, impact game aesthetics. This research will be examined as part of the statement of Hypothesis 2.

2.3 Game acceptance

Recent research has focused more on game acceptance to understand why game players enjoy and pay for games. Naureen and Faiz (2024) surveyed 188 players and found that aesthetic design, hedonic, utilitarian, and social motivations have direct impacts on game purchases. This means that game aesthetics and social dynamics directly affect game players' acceptance and further purchases in games. Sambe and Haryanto (2021) found that social influence and game aesthetics affect players' purchase intentions. Loyola et al. (2024) demonstrated that game aesthetic factors influenced players to engage and immerse themselves in computer and video games through the player involvement model. Therefore, this research, Hypothesis 3, will also examine the relationships between game aesthetics and game acceptance, such as purchasing, time engagement, and involvement.

2.4 Research framework and hypotheses

This research adopted the MDA approach and employed eight dimensions with relevant factors of game aesthetics to evaluate game players' perceptions of game aesthetics and further understand their acceptance of games.

The eight dimensions of game aesthetics are defined below, and the measurements will be developed accordingly:

1. *Sensation:* It refers to aspects of the visual, interactive, haptic, and aural experiences of games, such as image, colour, lighting, scenery, sound, music, facial emotions, actions, and physical interactions with the game design.
2. *Fantasy*: It refers to imagination and psychological experiences, allowing the game players to transcend real life, perceive their desires, and receive peak experiences. Game players can take various roles in games, gaining experiences and feelings that are not achievable in real life. Malone addressed "Fantasy" as a motivational factor that fulfils players' wishes by providing a virtual world detached from reality (Bai et al., 2022).
3. *Narrative:* It refers to stories, with game players becoming engrossed in the progressions of the narrative time, responses to the given locations, and emotions in the fate of the main characters of the experience. It can be defined as the sensation of being inside a story, fully engaged and accepting the world and events of the game journey (Donmingues et al., 2024). In this research, the game narrative encompasses traditional storytelling, including plots, characters, and dialogues, as well as the narrations of players' personal experiences, known as players' stories. The stories are developed by players' options in the games; because of the openness and nonlinear narrative structures, players' experiences in the game are unique.
4. *Challenge:* It refers to the design of the challenges in games, motivating players to experience and survive challenges and receive satisfaction and enjoyment. Empirical research has confirmed that players play to be challenged. The psychological theory of flow states that people feel enjoyment when their skills are appropriately matched to the difficulty of challenging tasks in games (Tornqvist and Tichon, 2021). "Challenge" is a major factor in game development, where the difficulty level should be challenging enough to match the gamer's ability to shape players' experience (Laurence et al., 2023).
5. *Discovery:* It refers to players exploring new areas, new solutions, properties, uncovering hidden secrets, or unlocking new content in games (Hunicke et al., 2004; Kim et al., 2017). "Discovery" can bring about aesthetic experiences; for example, mountains, rivers, towns, villages, cities, and even art and sculptures in the game can provide players with beautiful scenes to explore, evoking a strong sense of beauty. Dynamic sound effects, such as the rustle of leaves, the chirping of birds, and the sound of flowing water, together with visual elements, can create a sense of travel, allowing players to feel loneliness and tranquillity in the virtual world, which is also a unique aesthetic experience. When players explore the unknown world of the game, they may encounter various random events, valuable items, props, creatures, etc. The appearance of these elements increases the uncertainty of exploration, stimulating players' curiosity and desire to explore. Bateman also refers to this as uncertainty aesthetics (Bateman, 2015).
6. *Expression:* It refers to players expressing their thoughts, emotions, and values through role-playing, decision-making, and interaction with other characters in the game. It is also related to creating something or expressing oneself creatively (Kim et al., 2017). Through role-playing in games, players can project themselves onto virtual characters, explore different identities and life experiences, and thus gain a deeper understanding of their inner world and values.
7. *Submission:* It refers to going with the flow and being comfortably disengaged from real life, used by players to pass the time, escape reality, temporarily forget their worries and anxieties, and focus on enjoying the game. It also refers to the temporal engagement in which players concentrate on activities in games and forget time, depression, or stress, to the extent to which players' emotional needs such as leisure and entertainment, mood relaxation, and internal pleasure are satisfied by playing games (Laurence et al., 2023).
8. *Fellowship:* It refers to friendships, fellowships, communality, and intimacy in games. Games can be seen as a social network; players in games have opportunities to know each other and establish friendships or fellowships in the virtual worlds, and it is possible to build up communities or have intimate relationships (Kim, 2015). It is a part of game dynamics. Moreover, players' loyalty towards a game is found to be influenced by the level of social interactions and players' engagement with and experience. This process includes creating deep connections with other players, fostering a sense of enjoyment as they work together to complete various challenges and attain rewards and achievements together within the game (Cheah et al., 2022; Fu et al., 2024).

In terms of game acceptance, previous research mostly investigates the factors influencing the willingness to employ technologies to solve challenges or complete tasks and to feel enjoyment in the game. Game players' acceptance has been seen as a key factor in the success of games (Wang et al., 2016). The technology acceptance model (TAM) is based on the Theory of Reasoned Action (TRA) and proposes perceived usefulness, ease of use, behaviour, attitude, and other external variables, such as enjoyment, to predict user acceptance (Park et al., 2015; Choe and Schumacher, 2015; Bassiouni et al., 2019; Razami et al., 2022). This model was introduced and completed by Davis in 1985. However, the TAM has been extensively employed across different technological innovations, such as games, social media, e-commerce, and artificial intelligence (Kuang et al., 2023). To this day, it is still one of the leading theoretical models frequently used to predict technology acceptance and the use of information technology (Celik and Uslu, 2023; Bayir and Akel, 2024).

The research framework is as follows (Figure 1):

According to the aims of this research, the hypotheses are stated below:

> *Hypothesis 1:* Among the factors of game aesthetics, sensory experience, such as visual, auditory, and tactile, is weighted as the most important value.

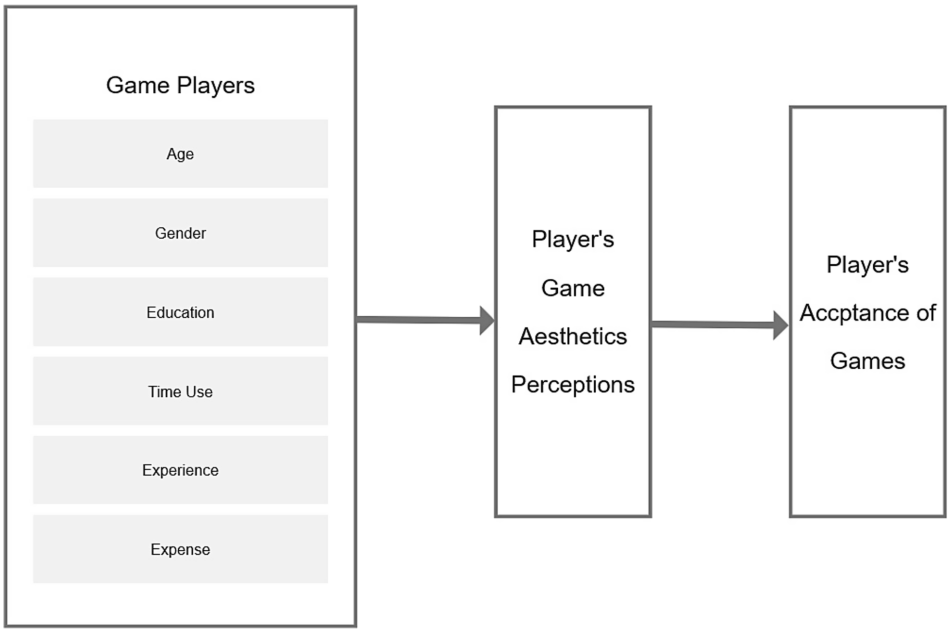

FIGURE 1
Research framework.

Hypothesis 2: ARPG players with different demographic backgrounds (age, gender, and education) have significantly different perceptions of game aesthetics.

Hypothesis 3: ARPG players' perceptions of game aesthetics have an influence on game acceptance.

3 Research methodology

The quantitative research method was employed to examine the hypotheses. The main target samples were game players who had experience in action role-playing games in general.

3.1 Questionnaire design

The questionnaire was structured into three main parts, totalling 68 questions. The first part regarded the game players' backgrounds, with seven questions asked of the players, including age, gender, educational level, weekly playtime, game experience, monthly budget/allowance, and expenditure on games. The second part related to game aesthetics, with fifty-three variables and measurements developed from the definitions of the eight dimensions described previously, including sensation, fantasy, narrative, challenge, discovery, expression, submission, and fellowship, which were covered in the MDA approach to game aesthetics. The third part related to game acceptance, where five questions were asked about game acceptance based on the concepts of the technology acceptance model (TAM), including usefulness, ease of use, attitude, behaviour, etc. The last part included three questions about other control variables, such as single-player or group players, self-time control, and the importance attached to game aesthetics or game mechanics.

The measurement employed a Likert five-point Likert scale, ranging from "strongly disagree" to "strongly agree" (including a neutral/ "neither agree nor disagree" option), to measure ARPG game players' perceptions of game aesthetics and acceptance.

3.2 Survey administration

The samples were selected by snowball and purposive sampling; five participants were invited to join the pilot test. They completed the questionnaire in between 2.5 and 6 min. The survey was conducted using the online survey platform Wenjuanxing, and WeChat was used to circulate the questionnaires or post the questionnaire link to ARPG online groups from the 8th to the 15th of April 2024. Participants could use their mobile devices to respond to this questionnaire. Finally, 505 questionnaires were collected, of which 43 were invalid because these samples had no experience in ARPGs. 462 were valid samples, and the average completion time for the questionnaire was 5 min, with a standard deviation of 103 s, which was about 1.7 min. The completion rate of the survey was 91.5%.

3.3 Statistical methods

SPSS was employed to analyse the data, and statistical methods, such as frequency, factor analysis, correlation, and *t*-tests were used to examine the hypotheses.

1. Frequency: It was employed to analyse the demographic backgrounds of the respondents and to understand the distributions of variables and attributes of the samples and population of this research.

2. Factor analysis and Reliability Test: Factor analysis was used for variable reduction, transforming a large number of observed variables into a smaller set of unobserved variables. It was employed to classify the variables of game aesthetics and game acceptance into different dimensions. Reliability was employed to test the correlation and consistency of variables in the same dimension.
3. Correlation: It is a measure of the strength and direction of the linear relationship between two variables. It is quantified by a correlation coefficient (=*r* value) to justify positive or negative relationships between two variables. It was employed to test the relationships between demographic backgrounds and game aesthetics, as well as the relationships between game aesthetics and game acceptance.
4. *T*-test: It is a tool used to determine if there is a significant difference between the means of two groups or the means of two events in a single group. It was employed to compare the difference between gender and game aesthetics, and the differences between gender and game acceptance.

3.4 Reliability and validity of the variables

The reliability and validity analyses were employed to examine the consistency and rationality of the variables. The Cronbach reliability analysis was employed to test those variables that present the game aesthetics and game acceptance. The Cronbach's alpha reliability of the sets of variables of game aesthetics was 0.981, indicating the sets of variables have high reliability; the game acceptance was 0.872, which also presents high reliability. For the validity analysis, the KMO was employed to perform the test. The validity of the game aesthetics was 0.975, and game acceptance was 0.896, indicating good validity of the measures. Both the high reliability and good validity of examinations confirm that the measurements are consistent and accurate.

3.5 Explained variance of game aesthetics

Moreover, the game aesthetics were constructed from the eight dimensions with different numbers of sub-item variables. Therefore, Factor Analysis was employed to condense these variables to understand the explained variance. Principal component analysis yielded a total of eight principal components, each with an eigenvalue larger than 1. The variance explained percentages for the eight primary components are 50.359, 5.554, 4.373, 4.149, 3.972, 3.418, 2.117, and 1.957%, respectively. The cumulative variance explained percentage is 75.898%, indicating the validity of the variables is good.

However, among the eight extracted factors, the percentage of the variance explained by Factor 1 is 50.359%, which is much higher than the other seven factors, indicating the respondents perceived that Factor 1 is the most important among the eight dimensions (Table 1).

4 Data analysis

4.1 The game players of this research

A total of 505 participants were surveyed by the research; as mentioned previously, 43 participants did not have role-play gaming experience, so the valid samples were 462 (see Tables 2, 3). 86.4% of interviewees were aged between 18 and 37, indicating the game players were mostly younger people. Educational backgrounds at college and university were 53.6%, and Master's and PhD were 32.3%, indicating the game players' educational backgrounds tended to be high.

Regarding game players' experiences, the time players spent on games varied: 25% of game players spent less than one hour playing games per week, 27.7% of them spent 1 to 2 h per week, 20.6% of them spent 3 to 4 h, and 17.2% of them spent 5 to 6 h.

In total, 43 participants of the survey (8.5%) did not have experience in role-play games, which were eliminated, and only 462 of them were used in further statistical analysis. Among the 462 respondents, 22.6% were freshmen, 37.2% had some experience, 19.8% had rich experience, and 11.9% were at the expert level.

Regarding the interviewees' gaming experience, 52.7% of interviewees played games for less than 2 h per week. More than 4 h was 26.7%. Among the interviewees, 37.2% had some experience in role-playing games, and 31.7% had rich experiences or were at an expert level (see Table 3). A total of 36.8% of interviewees spent less than 200 RMB on games per month, 28.3% spent 201 to 400 RMB,

TABLE 1 Total variance explained of game aesthetics.

Component	Eigenvalues			Principal component extraction		
	Eigenvalue	Percentage of variance explained %	Cumulative %	Eigenvalue	Percentage of variance explained %	Cumulative %
1	26.690	50.359	50.359	26.690	50.359	50.359
2	2.943	5.554	55.912	2.943	5.554	55.912
3	2.317	4.373	60.285	2.317	4.373	60.285
4	2.199	4.149	64.434	2.199	4.149	64.434
5	2.105	3.972	68.406	2.105	3.972	68.406
6	1.811	3.418	71.824	1.811	3.418	71.824
7	1.122	2.117	73.941	1.122	2.117	73.941
8	1.037	1.957	75.898	1.037	1.957	75.898

$N = 462$.

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TABLE 2 Demographics of game players.

Variables	Person (%)	Mean	Std error
Age		2.5	1.113
Under 18	61 (12.1%)		
18–27	259 (51.3%)		
28–37	107 (21.2%)		
38–47	38 (7.5%)		
48–57	30 (5.9%)		
57 Above	10 (2.0%)		
Gender		1.49	0.500
Male	256 (50.7%)		
Female	249 (49.3%)		
Education		2.9	1.229
Under diploma	71 (14.1%)		
Diploma	133 (26.3%)		
Bachelor	138 (27.3%)		
Masters	101 (20.0%)		
PhD	62 (12.3%)		

$N = 505$.

TABLE 3 Experience of game players.

Variables	Frequencies	Mean	Std error
Weekly playing time		2.59	1.29
Less than 1 h	126 (25.0%)		
1 to 2 h	140 (27.7%)		
3 to 4 h	104 (20.6%)		
5 to 6 h	87 (17.2%)		
More than 7 h	48 (9.5)		
Role-play gaming experience		3.04	1.11
No experience	43 (8.5%)		
Freshman	114 (22.6%)		
Have some experience	188 (37.2%)		
Rich experience	100 (19.8%)		
Expert level	60 (11.9%)		
Monthly pocket money		2.77	1.37
Less than 999 RMB	109 (21.6%)		
1,000–2,999 RMB	136 (26.9%)		
3,000–4,999 RMB	104 (20.6%)		
5,000–6,999 RMB	75 (14.9%)		
More than 7,000 RMB	81 (16.0%)		
Monthly expense on games		2.11	1.22
Less than 200 RMB	186 (36.8%)		
201–400 RMB	143 (28.3%)		
401–600 RMB	59 (11.7%)		
601–800 RMB	45 (8.9%)		
More than 800 RMB	29 (5.7%)		
No answer (missing)	43 (8.5%)		

$N = 462$.

11.7% spent 401 to 600 RMB, and 14.6% spent more than 600 RMB on games.

4.2 Perceptions of the game aesthetics

Factor analysis was employed to reassemble and reconstruct the dimensions of game aesthetics based on game players' perceptions, and eight dimensions were found in Table 4:

Dimension 1 includes 10 variables from questions 8 to 17. The Cronbach's Alpha of the reliability test was 96.0%, indicating a high consistency. These variables cover visual style and effect, details (texture, shadow, etc.), background music, sound effects, tactile feedback, image, clothing, expression and actions of characters, fictional geographical spaces, colours, and landscape design in games. The dimension, relevant to sensory experience, including visual, auditory, and tactile experience, was renamed "*Aesthesis*."

Dimension 2 includes nine variables from questions 24 to 32. The Cronbach's Alpha of the reliability test was 96.1%, indicating a high reliability. These variables cover the elements of game stories' beautiful reflections on life and living, game stories' unforgettable character images, game stories' enhanced artistic values, interest in game storylines, character developments, immersion in the game's stories and characters, game characters' inspiration in real life, personalised selection of storylines, and storylines' enhanced gaming experience. The dimension was renamed "*Story*."

Dimension 3 includes eight variables from questions 33 to 40. The Cronbach's Alpha of the reliability test was 95.2%, indicating a high reliability. These variables involve feelings about game difficulty, such as frustration or excitement, feelings about overcoming challenges, actions for surviving challenges, and experiences from surviving challenges, such as enhanced gaming skills and problem-solving skills. The dimension was renamed "*Adventure*."

Dimension 4 includes seven variables from questions 54 to 60. The Cronbach's Alpha of the reliability test was 94.1%, indicating a high reliability. These variables are about the enjoyment of being with other characters, connections with other characters, sympathy for characters, revenge against other characters, resonating with characters, and paying attention to other characters. The dimension was renamed "*Connections*."

Dimension 5 also includes seven variables from questions 44 to 50. The Cronbach's Alpha of the reliability test was 94.3%, indicating high reliability. These variables concern relations between game players and their idealised selves, personalities, values, preferences, futures, potentials, and cultural expressions. The dimension was renamed "*Character*."

Dimension 6 includes six variables from questions 18 to 23. The Cronbach's Alpha of the reliability test was 93.7%, indicating high reliability. These variables are about achieving imagination that cannot be realised in real life, storylines stimulating imagination, the feeling of surpassing self in games, enjoying resonances with characters, game imagination enriching thinking, perception, and action abilities, and feeling happy and satisfied with the imaginative world. The new dimension was renamed "*Imagination*."

Dimension 7 includes three variables from questions 51 to 53. The Cronbach's Alpha of the reliability test was 86.5%, showing high reliability. These variables express playing games as part of leisure time, relaxing, and escaping the pressures of daily life. The dimension was renamed "*Leisure*."

Dimension 8 includes three variables from questions 41 to 43. The Cronbach's Alpha of the reliability test was 87.5%, indicating high reliability. These variables involve enjoying the games' rich world and background stories, discovering secrets and rewards, and stimulating curiosity and desire for exploration. The dimension was renamed "*Exploration*."

Based on the statistical analysis, the ARPG game aesthetics from players' perceptions include eight dimensions: aesthesis, story, adventure, character, connection, imagination, leisure, and exploration. Among these dimensions, the weighting of the dimension "aesthesis" is higher than that of the other dimensions (Eigenvalue = 26.690, explained variance = 50.359%), indicating that "*aesthesis*" is the most important factor in game aesthetics. Therefore, the H1: Among the factors of game aesthetics, visual, aural, and tactile are weighted the highest values, supported by the statistical results.

Secondly, "story" (Eigenvalue = 2.943, explained variance = 5.554%) and "adventure" (Eigenvalue = 2.317, explained variance = 4.373%) are also important in game aesthetics, presenting about 10% of explained variance. Moreover, in role-playing games, the dimension "connection" is required, which is ranked as the fourth most important factor.

4.3 Game acceptance

In terms of game acceptance, the Reliability Test was employed to examine the consistency of the set of questions from questions 61 to 65; the reliability was 92.7%. Factor analysis was employed to assemble the dimensions of these variables; only one factor was found and the cumulative explained variance was 77.39%. The set of variables was named "*Acceptance*" (Tables 5, 6).

4.4 Different players' backgrounds and game aesthetics

To investigate the differences between game players with different backgrounds and their perceptions of game aesthetics, the correlation was employed in the data analysis. The Pearson correlation coefficient (=r) is the most common way of measuring a linear correlation. The statistical results showed there are positive relationships among game players' different educational backgrounds ($r = 0.409$, $p < 0.001$), weekly time spent on games ($r = 0.424$, $p < 0.001$), their experience in games ($r = 0.349$, $p < 0.001$), and their monthly expenses on games ($r = 0.439$, $p < 0.001$) have significantly different perceptions of game aesthetics (see Tables 7, 8). Game players with higher educational backgrounds require greater game aesthetics, as well as game players who spend more time on games, have more experience in role-playing games, and spend more on games that have more requirements for game aesthetics.

However, the correlation examined that game players' age has no significant relationship with game aesthetics ($r = -0.041$, $p > 0.05$), indicating there is no significant difference between game players of different ages and their perceptions of game aesthetics. But the statistical results showed the relationship is negative, indicating the younger game players have more requirements for game aesthetics;

TABLE 4 Dimensions of players' game aesthetics.

Rotated component matrix								
	Component							
	1	2	3	4	5	6	7	8
8. Visual style is important in role-play games	0.761	0.163	0.175	0.192	0.185	0.162	0.094	0.099
9. Details, i.e., texture and shadow, are important	0.769	0.232	0.174	0.135	0.165	0.154	0.101	0.071
10. Background music is important in role-play games	0.734	0.175	0.187	0.172	0.194	0.136	0.103	0.164
11. Sound effect is important in role-play games	0.730	0.201	0.168	0.115	0.159	0.207	0.080	0.071
12. Tactile feedback in games enhanced gaming experiences	0.735	0.185	0.217	0.211	0.191	0.158	0.092	0.013
13. Image, clothing, expressions and actions of game characters are important visual elements	0.767	0.219	0.122	0.171	0.185	0.165	0.100	0.113
14. The diversity of fictional geographic spaces affects players' exploration experience	0.722	0.236	0.179	0.154	0.143	0.170	0.107	0.159
15. Colours are crucial for the atmosphere and emotional expression in games	0.746	0.191	0.189	0.145	0.199	0.151	0.138	0.116
16. Landscape design brings a sense of beauty	0.750	0.228	0.165	0.164	0.221	0.175	0.077	0.058
17. Sound and visual effects in games together create a beautiful visual experience	0.763	0.178	0.216	0.170	0.164	0.177	0.095	0.090
18. Games enable you to achieve imagination that cannot be realised in real life	0.249	0.231	0.180	0.176	0.232	0.736	0.107	0.074
19. Storylines in games stimulate your imaginations	0.266	0.202	0.211	0.173	0.196	0.726	0.094	0.121
20. You can experience a feeling of surpassing yourself in games	0.227	0.259	0.200	0.198	0.190	0.696	0.063	0.083
21. You enjoy resonating with characters through game imagination	0.250	0.211	0.249	0.156	0.261	0.677	0.092	0.134
22. Game imagination helps to expand, enhance and enrich your thinking, perception and action abilities	0.284	0.158	0.194	0.220	0.196	0.726	0.135	0.108
23. The imaginative world provided by games makes you feel happy and satisfied	0.227	0.260	0.227	0.175	0.129	0.702	0.167	0.151
24. Game stories trigger you reflection on living and life, creating a beauty that transcend the surface	0.238	0.724	0.227	0.215	0.188	0.176	0.100	0.104
25. Game stories present unforgettable character images, injecting vitality and beauty into the games	0.227	0.717	0.222	0.210	0.177	0.159	0.126	0.051
26. The diversity of game stories enables the discovery of aesthetics complexity and richness at different levels which enhanced artistic values of the game	0.262	0.721	0.208	0.249	0.148	0.219	0.111	0.094
27. You are interested in the storyline of games	0.221	0.752	0.218	0.131	0.148	0.186	0.097	0.149
28. Character developments in games meet your expectations	0.211	0.740	0.164	0.222	0.201	0.175	0.077	0.114
29. After completing games, you often contemplate the stories and characters of the games	0.208	0.738	0.221	0.236	0.204	0.170	0.040	0.110
30. The experiences of the characters in games have inspired your real life	0.198	0.723	0.229	0.195	0.218	0.126	0.098	0.134
31. The selection of diverse storylines in games makes you feel your story in games is more personalised	0.264	0.735	0.238	0.210	0.215	0.142	0.130	0.041
32. The storylines in games help to enhance the overall gaming experience	0.264	0.731	0.257	0.161	0.151	0.183	0.119	0.118

(Continued)

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TABLE 4 (Continued)

Rotated component matrix								
	Component							
	1	2	3	4	5	6	7	8
33. When encountering difficulties in games, you feel frustrated	0.165	0.222	0.710	0.220	0.194	0.191	0.024	0.066
34. When encountering difficulties in games, you feel excited	0.185	0.200	0.743	0.170	0.165	0.226	0.075	0.121
35. After you failing in games, you will try to find out solutions	0.158	0.230	0.747	0.195	0.134	0.126	0.157	0.069
36. You feel a sense of achievement after overcoming challenges in games	0.202	0.216	0.733	0.192	0.207	0.174	0.098	0.066
37. You enjoy learning new skills or strategies in games	0.245	0.227	0.718	0.256	0.135	0.173	0.125	0.084
38. You often explore different strategies to solve challenges in games	0.263	0.217	0.745	0.176	0.160	0.135	0.120	0.100
39. Challenges in games can enhance your gaming skills	0.279	0.235	0.714	0.240	0.182	0.146	0.119	0.133
40. Challenges in games can enhance your problem-solving skills	0.218	0.270	0.736	0.172	0.262	0.157	−0.005	0.101
41. You enjoy the rich world and background stories that can be explored in games	0.258	0.293	0.225	0.219	0.220	0.195	0.122	0.641
42. Discovering hidden secrets and rewards in games enhances your gaming experience	0.254	0.248	0.201	0.183	0.226	0.248	0.137	0.699
43. Uncertain challenges in games stimulate your curiosity and desire for exploration	0.303	0.234	0.215	0.204	0.222	0.206	0.070	0.691
44. The characters in games make you feel closer to your idealised self	0.253	0.182	0.204	0.172	0.739	0.142	0.113	0.123
45. Character interactions in games help you better understand yourself	0.258	0.210	0.193	0.166	0.742	0.184	0.114	0.063
46. Your choices in role-playing express your personality and values	0.226	0.181	0.203	0.197	0.741	0.092	0.139	0.125
47. The decisions you make in games help you better understand your preference	0.249	0.235	0.202	0.154	0.725	0.165	0.122	0.114
48. The story you experienced in games help you think about your future	0.206	0.196	0.241	0.171	0.690	0.214	0.143	0.103
49. Role playing in games helps you discover your own potential	0.171	0.189	0.145	0.278	0.702	0.238	0.132	0.059
50. The world of game design has distinct cultural expressions	0.247	0.217	0.152	0.171	0.732	0.176	0.067	0.104
51. Games are an important part of your leisure time	0.230	0.216	0.164	0.149	0.237	0.238	0.743	0.101
52. You please games mainly to relax	0.308	0.195	0.151	0.221	0.282	0.188	0.660	0.071
53. Games are a way for you to escape the pressures of daily life	0.248	0.229	0.238	0.195	0.235	0.138	0.699	0.119
54. You enjoy being with other characters in games	0.172	0.188	0.249	0.741	0.147	0.179	0.081	0.048
55. You feel you established some kind of connections with other characters in games	0.195	0.149	0.223	0.746	0.164	0.136	0.141	0.066
56. You feel sympathy for characters' situation in games	0.215	0.290	0.189	0.728	0.190	0.180	0.118	0.083
57. You may have thoughts of revenge against other characters in games	0.166	0.256	0.220	0.728	0.131	0.109	0.065	0.069
58. You feel happy because of the happiness of the game character	0.239	0.226	0.157	0.726	0.181	0.106	0.130	0.170
59. You pay attention to the movement and behaviour of other characters in games	0.189	0.218	0.184	0.731	0.224	0.202	0.024	0.094
60. You feel like you have been being cared by other characters in games	0.193	0.189	0.218	0.745	0.211	0.151	0.078	0.099

* Extraction method: principal component analysis. * Rotation method: varimax with Kaiser normalisation.

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TABLE 5 Factor analysis of game acceptance.

Total variance explained						
	Initial eigenvalues			Extraction sums of squared loadings		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	3.870	77.393	77.393	3.870	77.393	77.393
2	0.339	6.773	84.165			
3	0.293	5.867	90.033			
4	0.263	5.252	95.285			
5	0.236	4.715	100.000			

* Extraction method: principal component analysis.

TABLE 6 Components of game acceptance.

Component matrix[a]	
	Component
	1
61. The factors of game aesthetics mentioned above have a significant impact on your willingness on playing game	0.865
62. Other Players' evaluations, ratings and forum about game aesthetics mentioned above will affect our attitude towards games	0.882
63. You will purchase games with high-quality aesthetics.	0.884
64. You are more willing to recommend games with captivating aesthetic features to others.	0.886
65. If a game has excellent aesthetic features, your playtime will increase.	0.883

* Extraction method: principal component analysis.[a]
[a]1 components extracted.

TABLE 7 The relationships between game players' backgrounds and perceptions of game aesthetics.

		Age	Education	Weekly time	Experience	Monthly pocket money	Expense on games
Game aesthetics	Pearson	−0.041	0.409***	0.424***	0.394***	−0.024	0.439***
	Sig.	0.378	<0.001	<0.001	<0.001	0.606	<0.001
	N	462	462	462	462	462	462

*** $p < 0.001$ (2-tailed), ** $p < 0.01$ level (2-tailed), * $p < 0.05$ level (2-tailed).

however, the phenomenon is not significantly supported by the statistical analysis.

The *T*-test was employed to analyse the different genders of the game players and their perceptions of game aesthetics. The statistical result demonstrated that there is no difference between gender and game aesthetics (see Table 9).

Therefore, H2: Players with different demographic backgrounds (age, gender, and education) have significantly different perceptions of game aesthetics, which the statistical results do not fully support.

4.5 Game aesthetics and acceptance of games

Correlation was employed to examine the relationships between game players' game aesthetics and their acceptance of games. The results showed that game players' game aesthetics affect their game acceptance (see Table 10), with a positive relationship indicating that game players' perceptions of the game aesthetics are more positive and that they are more likely to accept the games. Therefore, H3: The perceptions of game aesthetics have influences on game acceptance, was demonstrated by the statistical results.

5 Findings and discussion

Game aesthetics is a systematic approach to understanding how gamers appreciate games. It concerns game design and development and includes players' perceptions of their sensory gaming experience, such as visual, aural, tactile experiences, psychological feelings, and interactions with other game players. Therefore, understanding the factors and dimensions of game aesthetics is important.

The findings indicate that the dimension of "Aesthesis" is the most important in game aesthetics, supporting Hypothesis 1: Among the factors of game aesthetics, sensory experiences, such as visual, auditory, and tactile, are weighted as the most important values. Abu Baker and Bahrin (2024) only employed these elements to examine game aesthetics in their research. Abubakar et al. (2016) used these elements to define game aesthetics that are understandable.

TABLE 8 Relationships among the game players' backgrounds and the dimensions of the game aesthetics.

Dimensions of game aesthetics		Age	Education	Weekly time use	Experience	Monthly pocket money	Expense on games
Aesthesis	Pearson	−0.032	0.344***	0.344***	0.360***	−0.029	0.361***
	Sig.	0.497	<0.001	<0.001	<0.001	0.541	<0.001
Stories	Pearson	−0.033	0.315***	0.343***	0.334***	−0.043	0.306***
	Sig.	0.477	<0.001	<0.001	<0.001	0.359	<0.001
Adventure	Pearson	−0.025	0.315***	0.377***	0.293***	−0.008	0.347***
	Sig.	0.585	<0.001	<0.001	<0.001	0.859	<0.001
Connection	Pearson	−0.052	0.357***	0.334***	0.320***	0.033	0.392***
	Sig.	0.267	<0.001	<0.001	<0.001	0.480	<0.001
Character	Pearson	−0.040	0.329***	0.325***	0.319***	−0.007	0.380***
	Sig.	0.391	<0.001	<0.001	<0.001	0.879	<0.001
Imagination	Pearson	−0.035	0.330***	0.355***	0.302***	−0.040	0.389***
	Sig.	0.453	<0.001	<0.001	<0.001	0.389	<0.001
Leisure	Pearson	0.009	0.340***	0.342***	0.291***	−0.036	0.361***
	Sig.	0.846	<0.001	<0.001	<0.001	0.443	<0.001
Exploration	Pearson	−0.045	0.363***	0.351***	0.314***	−0.045	0.352***
	Sig.	0.339	<0.001	<0.001	<0.001	0.333	<0.001

$N = 462$.
*** $p < 0.001$ (2-tailed), ** $p < 0.01$ level (2-tailed), * $p < 0.05$ level (2-tailed).

TABLE 9 Difference between gender and aesthetics.

Variable	Significance (two-sided)	Mean difference	Std. error difference
Game aesthetics	0.209	5.98688	4.75872

$N = 462$.
*** $p < 0.001$ (2-tailed), ** $p < 0.01$ level (2-tailed), * $p < 0.05$ level (2-tailed).

Besides, the results of this research showed that the values of "Story," "Adventure," and "Connection" are ranked from second to fourth places, respectively, indicating that ARPG game players perceived story, challenge/rule design, and social interactions as important elements in sequential order. A comparison of these findings with Hunicke et al. (2004)'s model reveals that they originally placed "Narrative" as the third dimension and "Fellowship" as the last dimension. In fact, the social dynamic is far more important in the APRGs. As Bowmanm (2024) addressed, stories in APRGs can be profoundly moving and even life-changing for players as a site for identity construction, skill training, meaning-making, exploration of intimacy, and community building with others. As society becomes increasingly disenchanted, people seek fictional worlds into which to immerse themselves. It is not only concerned with game players' behaviours but also with their psychological dependency on the virtual environment, as well as escaping from social reality.

This research hypothesised that game players with different backgrounds have different perceptions of game aesthetics, but the findings show that gamers' gender and age do not affect their game aesthetics; only educational level does. Hypothesis 2: APRG players with different demographic backgrounds (age, gender, and education) have significantly different perceptions of game aesthetics, which is not fully demonstrated by the results. The results are slightly different from previous research. Jylha and Hamari (2022) found players' experience, gender, and age may have different perceptions of game aesthetics; Gonzalez-Gonzalez et al. (2022) also found that game players' gender and age have different preferences for game elements. However, game players' gaming experiences affect game aesthetics, such as the time spent on games and their experiences. Besides, these game players who spend money on games have different perceptions of game aesthetics compared with game players who have no expenses on games. In other words, players' educational level and their gaming experience affect their perceptions of game aesthetics, which is demonstrated by the statistical results of this research.

Regarding Hypothesis 3: APRG game players' perceptions of game aesthetics have an influence on game acceptance, which is demonstrated by the results. The finding indicates that game aesthetics have a significant impact on the players' willingness to play the games, and they are willing to spend more time on ARPG games because of the game aesthetics. These players purchase games with high-quality game aesthetics, and they are also more willing to recommend games with captivating aesthetic features to other game players. The finding coincides with Loyola et al. (2024)'s demonstration that game aesthetics factors affect game aesthetics factors affected game players' involvement.

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TABLE 10 Relationships between game aesthetics and game acceptance.

Dimensions		Game aesthetics	Aesthesis	Stories	Adventure	Connection	Character	Imagination	Leisure	Exploration
Game acceptance	Pearson	0.753***	0.607***	0.638***	0.621***	0.608***	0.619***	0.605***	0.586***	0.614***
	Sig.	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

$N = 462$.
*** $p < 0.001$ (2-tailed), ** $p < 0.01$ level (2-tailed), * $p < 0.05$ level (2-tailed).

6 Conclusion

This study employed quantitative methods to establish the measurements and dimensions of ARPGs' game aesthetics. Using the new measurements of game aesthetics to design and develop games may help bring game production closer to game players' perceptions of game appreciation, which may also make game players more likely to accept the games.

The results of this research demonstrate that game aesthetics significantly influence players' willingness to engage with games and their recommendations of these games to others in the ARPGs. Visual and auditory elements, along with tactile feedback, are critical factors in the success of a game; however, including the design of story, adventure, connection, character, imagination, leisure, and exploration would be a more comprehensive and multi-dimensional approach to attracting game players. ARPG players with higher education have higher standards and requirements in terms of game aesthetics; furthermore, those players who are experienced in games and spend money on games care highly about game aesthetics. The results provide valuable references for game designers and developers to consider their game products and their competitiveness in the market.

6.1 Limitations and future research

This research focused on ARPG game players to examine their perceptions of games; however, the results cannot fully explain overall game aesthetics and acceptance. Different game genres may have unique aesthetics, which require future research to explore and validate. Additionally, game aesthetics differ from traditional aesthetics, involving interactions and social dynamics. Since the game industry has become influential to society and culture, there is a need to develop a general game aesthetic model to predict the future of the game industry.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

The studies involving humans were approved by Xi'an Jiaotong-Liverpool University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

L-CM: Writing – original draft, Conceptualization, Writing – review & editing. SL: Writing – review & editing, Writing – original draft. YY: Writing – review & editing, Writing – original draft. KF: Writing – review & editing, Writing – original draft.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2025.1622613/full#supplementary-material

References

Abubakar, J. A., Ahmad, K. M., Zulkifli, N. A., and Bahrin, S. A. (2016). Conceptual model of game aesthetics for perceived learning in narrative games. In 2016 4th International Conference on User Science and Engineering (i-USEr), Melaka, Malaysia, IEEE Xplore. 111–115.

Abu Bakar, J. A., and Bahrin, A. S. (2024). Effects of game aesthetics on cultural learning. In Proceedings of the Asian CHI Symposium 2024, Online Malaysia, 102–108.

Bai, S., Hew, K. F., Gonda, D. E., Huang, B., and Liang, X. (2022). Incorporating fantasy into gamification promotes student learning and quality of online interaction. *Int. J. Educ. Technol. High. Educ.* 19:29. doi: 10.1186/s41239-022-00335-9

Bassiouni, D. H., Kackley, C., and Meshreki, H. (2019). The integration of video games in family-life dynamics: an adapted technology acceptance model of family intention to consume video game. *Inf. Technol. People* 32, 1376–1396. doi: 10.1108/ITP-11-2017-0375

Bateman, C. (2015). Implicit game aesthetics. *Games Cult.* 10, 389–411. doi: 10.1177/1555412014560607

Bayır, T., and Akel, G. (2024). Gamification in mobile shopping applications: A review in terms of technology acceptance model. Multi. Tools Appli, 83:47247–47268. doi: 10.1007/s11042-023-16823-7

Bernhaupt, R. (Ed.) (2015). Game user experience evaluation. Cham: Springer.

Bowmanm, S. L. (2024). Finding the self in role-playing games: weaving myth, narrative and identity. *Media Pract. Educ.* 25, 160–173. doi: 10.1080/25741136.2024.2324085

Calvillo-Gámez, E., Cairns, P., and Cox, A. (2015). "Assessing the Core elements of the gaming experience" in Game user experience evaluation. ed. R. Bernhaupt (Springer), 37–62.

Cardona-Rivera, R., Zagal, J., and Debus, M. (2020). GFI: a formal approach to narrative design and game research. Interactive Storytelling. In Proceedings of the 13th International Conference on Interactive Digital Storytelling (ICIDS 2020), Bournemouth, UK, Cham: Springer International Publishing, 133–148.

Celik, Z., and Uslu, A. (2023). The effect of blog contents on online purchase intention and research. *Gazi Iktisat ve Isletme Dergisi* 9, 134–150. doi: 10.30855/gjeb.2023.9.2.002

Cheah, I., Shimul, S. A., and Phau, I. (2022). Motivations of playing digital games: a review and research agenda. *Psychol. Mark.* 39, 937–950. doi: 10.1002/mar.21631

Chen, K. (2022). "The fallacies of MDA for novice designers: overusing mechanics and underusing aesthetics" in Research anthology on game design, development, usage, and social Impact, Information Science Reference, Hershey, Pennsylvania, 1222–1237.

Chen, C., Zhang, H., and Liang, D. (2024). The influence of game aesthetics on game engagement and retention in open-world, single-player games. In International Conference on Human-Computer Interaction. Cham: Springer Nature Switzerland, 149–160.

Choe, P., and Schumacher, D. (2015). Influence of different types of vibrations on technical acceptance of a mobile game aiming for hedonic satisfaction. *Int. J. Hum. Comput. Interact.* 31, 33–45. doi: 10.1080/10447318.2014.959101

Donmingues, J. M., Filipe, V., Carita, A., and Carvalho, V. (2024). Understanding the impact of perceived challenge on narrative immersion in video games: the role-playing game genre as a case study. *Information* 15:294. doi: 10.3390/info15060294

Egenfeldt-Nielsen, S., Smith, J. H., and Tosca, S. M. (2020). Understanding video games: The essential introduction. *4th* Edn. New York: Routledge.

Fencott, C., Clay, J., Lockyer, M., and Massey, P. (2012). Game invader: The theory and understanding of computer games. Piscataway, NJ: Wiley-IEEE Computer Society Press.

Frasca, G. (1999). Ludology meets narratology: Similitude and differences between (video) games and narrative. Parnasso, 3, 365–371.

Fu, K., Liu, Z., Ren, X., and Zhang, S. (2024). Design and research of educational mode in context of teaching gamification. *Entertain. Comput.* 50:100685. doi: 10.1016/j.entcom.2024.100685

Gonzalez-Gonzalez, C. S., Toledo-Delgado, P. A., Munoz-Cruz, V., and Arnedo-Moreno, J. (2022). Gender and age differences in preferences on game elements and platforms. *Sensors* 22:3567. doi: 10.3390/s22093567

Hunicke, R., LeBlanc, M., and Zubek, R. (2004). MDA: a formal approach to game design and game research. In: Proceedings of the Workshop on Challenges in Game AI at the 19th National Conference on Artificial Intelligence. 4:1722.

Jafarkhani, F., Barani, F., Nawaser, K., Rashidi, H., and Gharleghi, B. (2024). Factors affecting the Aethestic experiences in educational games: a qualitative investigation. *J. Econ. Technol.* 2, 200–207. doi: 10.1016/j.ject.2024.07.002

Junior, R., and Silva, F. (2021). Redefining the MDA framework- the pursuit of a game design ontology. *Information* 12:395. doi: 10.3390/info12100395

Jylha, H., and Hamari, J. (2022). Demographic factors have little effect on aesthetic perceptions of icons: a study of mobile game icons. *Internet Res.* 32, 87–110. doi: 10.1108/INTR-07-2020-0368

Kaye, L. K. (2021). Understanding the "social" nature of digital games. *Entertain. Comput.* 38:100420. doi: 10.1016/j.entcom.2021.100420

Kim, B. (2015). Game mechanics, dynamics, and aesthetics. *Libr. Technol. Rep.* 51, 17–19.

Kim, S., Song, K., Lockee, B., and Burton, J. (2017). "Gamification framework" in Gamification in learning and education. *Enjoy Learning Like Gaming*, eds. S. Kim, K. Song, B. Lockee, J. Burton. (Cham: Springer International Publishing). 59–90. doi: 10.1007/978-3-319-47283-6

Kuang, T. M., Agustina, L., and Monalisa, Y. (2023). Acceptance of digital game-based learning by accounting and business lecturers: empirical evidence from Indonesia based on the extended technology acceptance model. *Acc. Educ.* 33, 391–413. doi: 10.1080/09639284.2023.2207174

Laurence, H. A., Bernarto, I., and Antonio, F. (2023). Video game engagement: a passket to the intentions of continue playing, purchasing virtual items, and player recruitment (3Ps). *Int. J. Comput. Games Technol.* 2023, 1–13. doi: 10.1155/2023/2648097

Loyola, C., Miguel, S. J. M., and Ventura, J. M. F. (2024). The influence of aesthetic factors on game immersion through the player involvement model. *Iconic Res. Eng. J.* 7, 374–382.

Martyastiadi, Y., Tjandra, A., and Rizaldi, M. (2019). Aesthetics of interaction on virtual reality with educational games. In Proceedings of the 1st international conference on Intermedia Arts and creative technology (CREATIVEARTS 2019), Yogyakarta, Indonesia,162–171.

Naureen, S., and Faiz, S. (2024). Aesthetic design and in-game purchases, with consideration of hedonic, utilitarian, and social motivation in game purchase. Utilitarian, and Social Motivations. Available online at: https://ssrn.com/abstract=4918874 (accessed December 18, 2024).

Niedenthal, S. (2009). "What we talk about when we talk about game aesthetics" in Proceedings of DiGRA 2009 Conference: Breaking new ground: Innovation in games, play, practice and theory. London, UK: DiGRA DL.

Park, E., Baek, S., Ohm, J., and Chang, H. J. (2015). Determinants of player acceptance of Mobile social network games: an application of extended technology acceptance model. *Telematics Inform.* 31, 3–15. doi: 10.1016/j.tele.2013.07.001

Possler, D., and Klimmt, C. (2023). "Towards a model of the entertaining appeal of video game aesthetics" in Computerspielforschung: Interdisziplinäre Einblicke in das digitale Spiel und seine kulturelle Bedeutung [Computer game research: Interdisciplinary insights into the digital game and its cultural significance]. eds. R. Biermann, J. Formme and F. Kiefer, Verlag Barbara Budrich, 141–157. doi: 10.3224/84742669

Putra, R. W. (2021). Virtual aesthetics on Dreadeye VR game. *RSF Conf. Ser. Bus. Manag. Soc. Sci.* (Research Synergy Foundation). 1, 24–28.

Razami, H. H., Ibrahim, R., and Aljuaid, N. M. (2022). A review of models and factors for digital educational games acceptance and user experience. In 2022 international symposium on multidisciplinary studies and innovative technologies (ISMSIT), Ankara, Turkey: IEEE Xplore, 37–42.

Revi, A., Millard, D., and Middleton, S. (2020). A systematic analysis of user experience dimensions for interactive digital narratives. In Proceedings of the 13th Interactive Digital Storytelling (ICIDS 2020), Bournemouth, UK, NCham: Springer International Publishing, (58–74).

Sambe, A. H. N., and Haryanto, J. O. (2021). The development of social influence and aesthetics on purchase intention. *Jurnal Manajemen* 25, 1–19. doi: 10.24912/jm.v25i1.700

Scidone, E., Phillip, M. J., and Pantaleo, A. M. (2024). Hiding in the shadows: a qualitative exploration of women gamers' identities and perceptions of the video gaming context. *SN Soc. Sci.* 4:181. doi: 10.1007/s43545-024-00980-z

Sicart, M. (2023). The beautiful rule: thinking the aesthetics of game rules. *Games Cult.* 18, 889–906. doi: 10.1177/15554120221149532

Suh, A., Wagner, C., and Liu, L. (2015). The effect of game dynamics on user engagement in gamified system. In 2015 48th Hawaii international conference on system sciences, Hawaii. IEEE Xplore. 672–681.

Tornqvist, D., and Tichon, J. (2021). Motivated to lose? Evaluating challenge and player motivations in games. *Behav. Inf. Technol.* 40, 63–84. doi: 10.1080/0144929X.2019.1672789

Wang, J. (2023). Intellectual property protection for video games: a MDA framework-based analysis. *J. Gaming Virtual Worlds* 15, 177–194. doi: 10.1386/jgvw_00079_1

Wang, D. M., Cmentowski, S., Mogavi, R. H., Nathan, K. S., Kukshinov, E., Tu, J., et al. (2025). From solo to social: exploring the dynamics of player cooperation in a co-located cooperative Exergame. In CHI'25 Proceeding: 2025 CHI Conference on Human Factors in Computing System, Cham: Springer International Publishing, 411, 1–16.

Wang, X., Goh, D. H.-L., Lim, E.-P., and Vu, A. W. L. (2014). Player acceptance of human computation games: an aesthetic perspective. In International Conference on Asian Digital Libraries, Chiang Mai, Thailand, Cham: Springer International Publishing. pp, 133–148.

Wang, X., Goh, D. H.-L., Lim, E.-P., and Vu, A. W. L. (2016). Understanding the determinants of human computation game acceptance: the effects of aesthetic experience and output quality. *Online Inf. Rev.* 40, 481–496. doi: 10.1108/OIR-06-2015-0203

Williams, J., Bendell, R., Fiore, S., and Jentsch, F. (2021). Towards a conceptual framework of comprehensive video game player profiles: player models, mental models, and behaviour model. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting. Sage CA: SAGE Publications, 65:807–811.

Yang, D. J., Lu, M. Y., Chen, C. W., Liu, P. C., and Huo, I. C. (2022). Development of a therapeutic video game with the MDA framework to decrease anxiety in preschool-aged children with acute lymphoblastic leukemia: mixed methods approach. *JMIR Serious Games* 10:e43211. doi: 10.2196/37079

Zagal, J. P., and Tomuro, N. (2010). The aesthetics of gameplay: a lexical approach. In Proceedings of the 14th International Academic MindTrek Conference: Envisioning Future Media Environments. Tampere, Finland, 9–16.