A Constructive Game Based Learning Application in Enhancing Knowledge For Cat Grooming Practices

Norzatul Bazamah Azman Shah, Zaid Zubir, Rashidah Ramle, Siti Fatimah Mohd Rum

College of Computing, Informatics and Mathematics, Universiti Teknologi MARA (UiTM),
73000 Jasin, Malacca, Malaysia
Corresponding Author Email: norzatulb@uitm.edu.my

Abstract
Cat grooming is an essential aspect of pet care that requires special skills and knowledge. Many cat owners are lack of the information in cat grooming or do not know how to properly groom their cats, which is one of the major problems. The focus of this study is to establish the potential of a constructive game-based learning application of cat grooming through the digital platform by applying gamification elements. This innovative platform combines the captivating elements of gaming with comprehensive educational content to provide a unique and engaging learning experience for cat owners, groomers, and enthusiasts. The primary methodology adopted is the Game Development Life Cycle (GDLC) which provides a structured and iterative framework, ensuring the development of engaging and effective cat grooming game-based learning. The study's findings reveal the successful integration of usability principles into this application. User-centric design considerations, ease of navigation and immersive gameplay experiences have optimized to enhance user engagement and learning outcomes. Users have provided positive feedback, highlighting the application's user-friendly interface and ability to efficiently meet their learning goals. As for future works, by merging the engaging elements of gaming with educational objectives with 3D environment experiences, this innovative approach not only addresses the immediate demands of cat owners, but also opens up possibilities for reforming the larger field of pet care education.
Keywords: Cat Grooming, Gamed-Based Learning, Educational Tool, 2D Environment, Gamification

Introduction
Regular grooming helps prevent discomfort and disease by preventing matting, hairballs, and skin infections. According to McDonald et al (2022), many cat owners are unaware of how crucial grooming is and how it might impact their cat's overall health. The study found that most cat owners knew that regular grooming was important, but many did not know the specific benefits, such as preventing mats and tangles, lowering the risk of skin problems, and

finding early signs of health problems. These results show that more people need to know how important grooming and hygiene are for cats and that cat owners need to be taught the best ways to care for their cats' health and groom them. Based on survey conducted from 58 respondents, 79.3% voted that they never play any educational games on cats, only 20.7% or 12 people that voted yes for the question and stated that they played the educational games through a 3D game. It shown based on the result that most people never play any educational games on cats. On the other section of the survey, 60.3% said that they have a hard time understanding on how to groom a cat. It shows that there is still a lot of people who still does not know how to groom a cat and having a hard time understanding the grooming process.

Cat grooming is an essential aspect of pet care, contributing to a cat's overall health and well-being. However, mastering grooming techniques can be challenging. "Cat Grooming" application addresses this challenge by leveraging game-based learning principles to make the learning process enjoyable and effective. Users can access the application on various platforms, such as smartphones, tablets, and computers. Users are introduced to various grooming techniques through interactive tutorials. These tutorials use animations, videos, and step-by-step instructions to demonstrate proper grooming practices. Gamified challenges and quests provide an opportunity for users to practice grooming skills in simulated real-world scenarios. They can earn rewards and progress through levels as they complete tasks accurately and efficiently. By incorporating game elements, "Cat Grooming" application keeps users motivated to learn and practice cat grooming skills consistently. Users gain practical experience through virtual simulations, enabling them to build confidence before applying their skills to real cats. The application covers a wide range of grooming practices, from basic brushing to advanced styling, ensuring users have a well-rounded understanding. Dedicated sections focus on safety protocols, stress reduction techniques, and recognizing signs of discomfort in cats during grooming. Users learn to prioritize the well-being of the cat and ensure a positive experience. Users can experiment with different techniques and learn from mistakes without risking harm to real animals.

Methods
The results of these research endeavors provide a more in-depth description of each work activity that comprise the Game Development Life Cycle (GDLC) model. Understanding workflow is a crucial process to achieve the objectives of this study. Figure 1 shows the flow of research process and the sequential order of the activities. The processes include data gathering, pre-production, production, and testing.
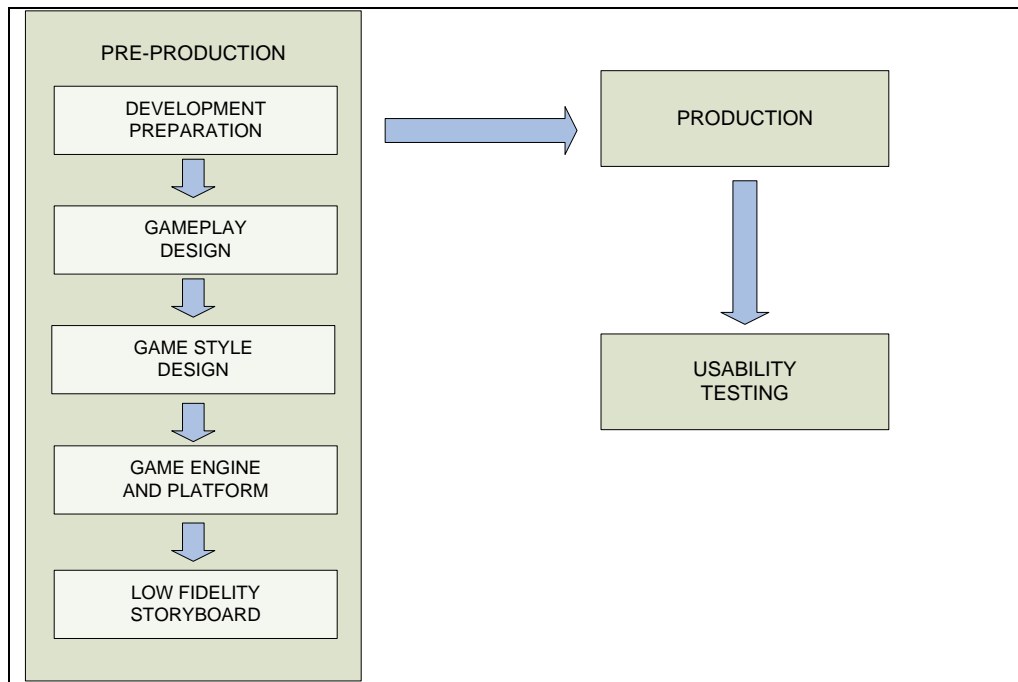
Figure 1: Research Design

A. Pre-Production

The process of game planning and design is analogous to the pre-production phase of the production cycle. Create a detailed game design document (GDD) that outlines all aspects of the application, including process, gameplay, graphics, audio, and user interface. Develop initial sketches, wireframes, and mock-ups to visualize the user interface and game elements. Plan the overall art style, animation, and visual aesthetics that align with the cat grooming theme.

B. Production

Develop the application's architecture and infrastructure, including the backend systems to support progress tracking features. Develop the game mechanics, including the interactive tutorials, virtual pet simulation, challenges, and quests. Create 2D/3D assets for the virtual cats, grooming tools, environments, and user interface elements. Implement the gamified elements, such as levelling, rewards, and progress tracking. Develop the comprehensive knowledge modules, integrating educational content about proper grooming practices.

C. Usability Testing

Release a prototype version of the application to a limited audience for further testing and feedback. Tests of the usability were being run to see if the targets have been met. Quantitative data on usability issues or difficulties and device performance (like usefulness, whether the game is user-friendly, whether a new user can quickly grasp how to use the game, the device's ease of use, and the user's satisfaction) could be gathered through usability testing with the intended audience.

Result and Discussion

A. Gameplay Design

Gameplay was created by using a flowchart. The flowchart acts as a guideline for the process flow of this application. The game requirements were obtained during the game development preparation phase, and then the flowchart was developed based on the requirements. The flowchart for this project can be seen in Figure 2 below.
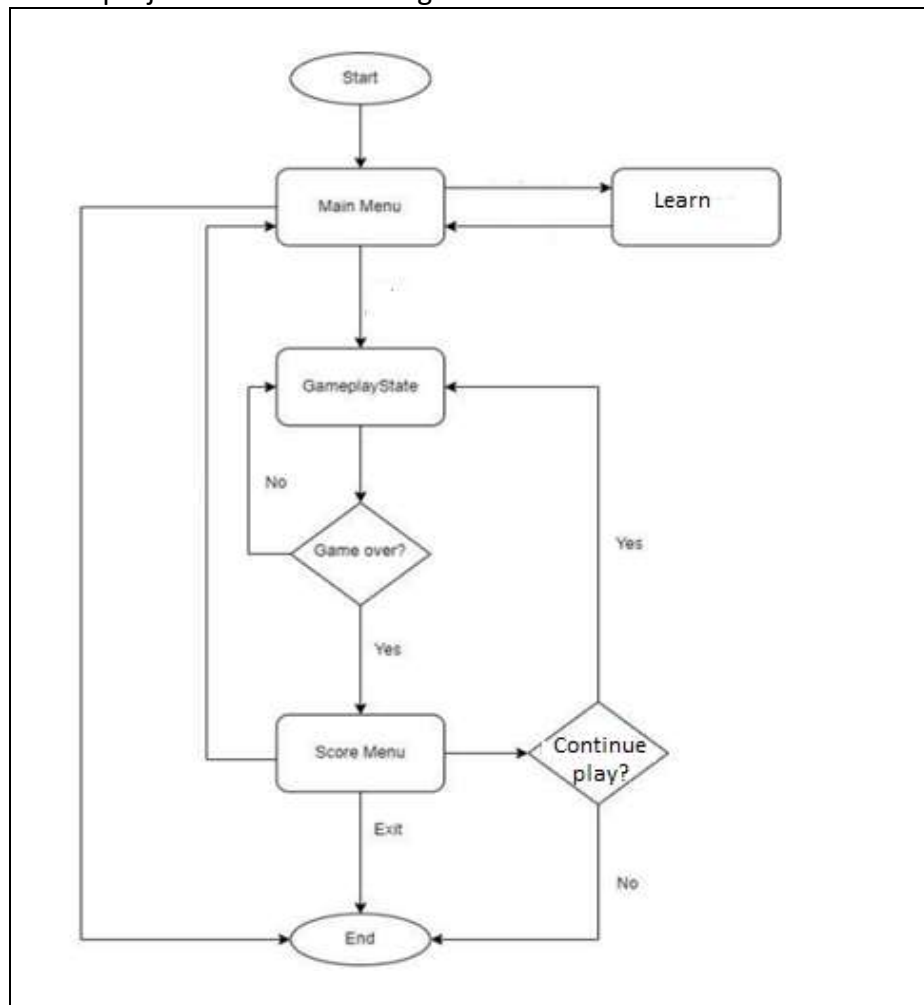

Figure 2: Flowchart of the "Cat Grooming" application

B. Game Style Design

The design aesthetic that will be utilised for this undertaking is one that is reminiscent of a 2D game. 2D game style refers to the visual design of a video game that uses two-dimensional graphics, as opposed to three-dimensional graphics. This style is characterized by flat images or sprites and a side-scrolling or top-down perspective. The example of 2D style as shown in Figure 3.
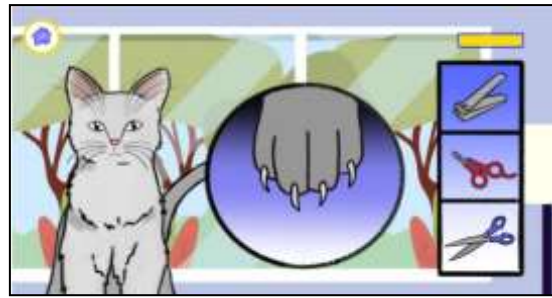
Figure 3: 2D Game Style

C. High-Fidelity Storyboard

A high-fidelity storyboard offers a more accurate representation of the final result and more complex visuals. On the basis of how the game would appear, it is further understandable.
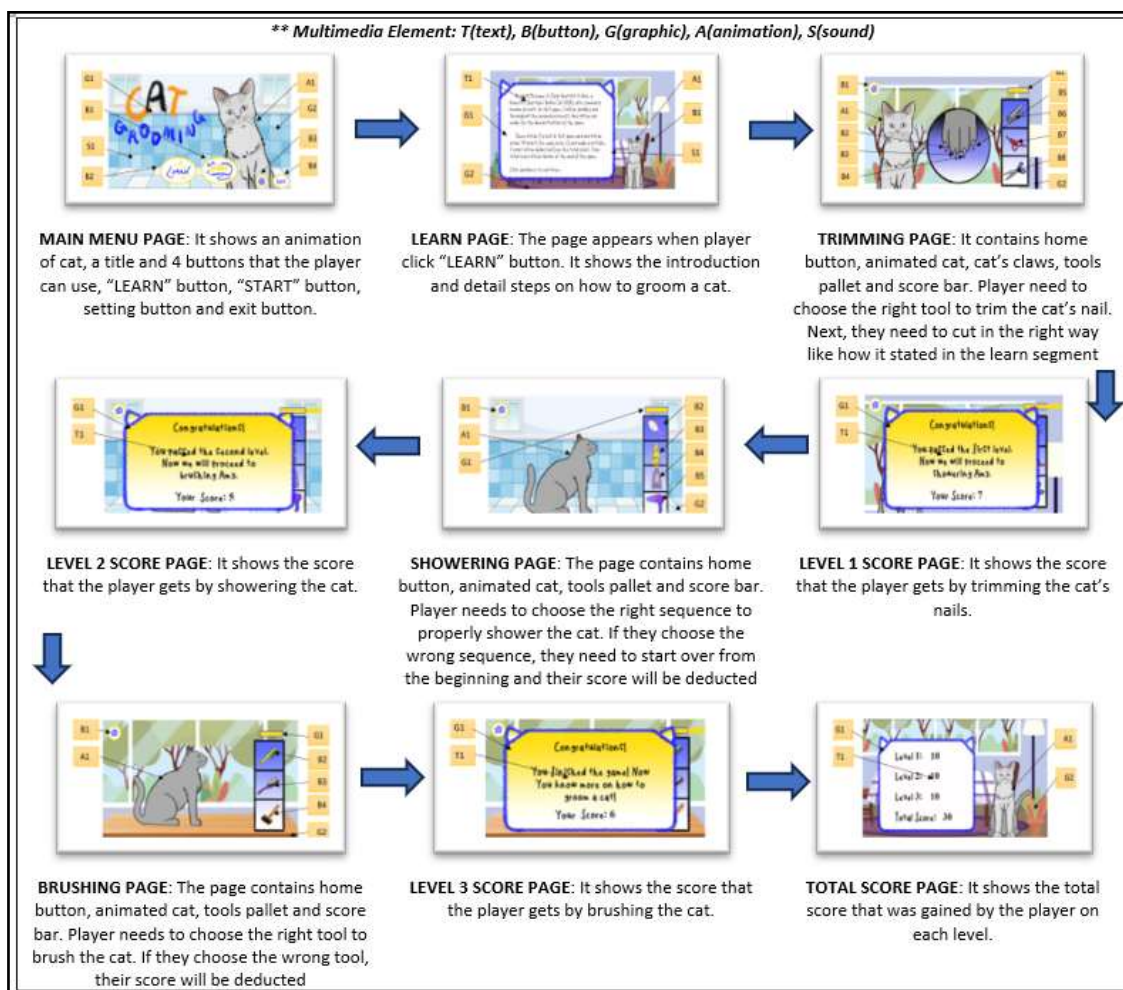

Figure 4: Storyboard of the "Cat Grooming" application

D. Gamification Elements

A Game Flow Model was used to construct "Cat Grooming" application. The Game Flow Model provides a summary of the foundational elements of the gamification setups. This paradigm was selected because it strategically used to provide gamified solutions.

Concentration
The player needs full concentration on learning from the learn section. With concentrating, the player can play the game more smoothly despite the game needs memorisation of the steps on how to groom a cat. Figure 5 displays the techniques for showering a cat in the proper sequence.
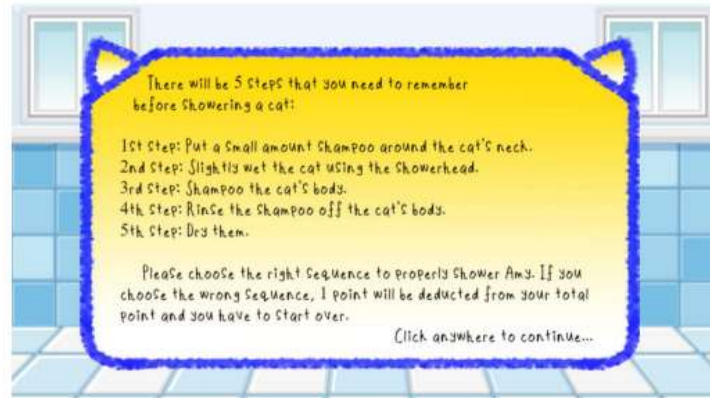

Figure 5: Steps to shower a cat.

Challenge
There are plenty of challenges in the game, one of them is that the player needs to remember from the learn section that the cat's nails to be trim only at the end and the player cannot trim the nail too far deep where it can cause the cat pain and serious injury. If the player cuts them short, the cat will be upset, and the marks will be deducted from the total point. Figure 6 shows the nail trimming level.
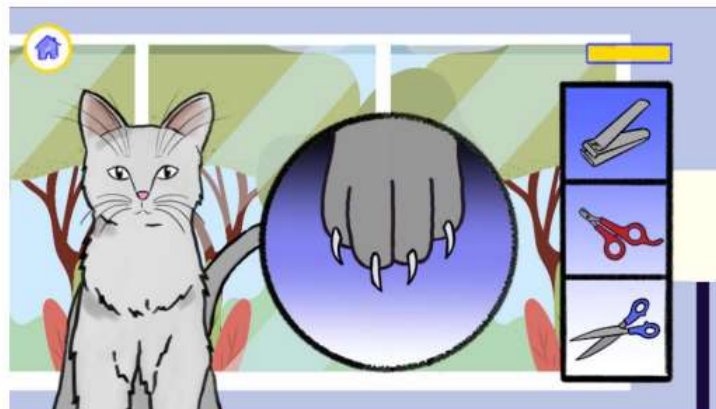

Figure 6: Nail trimming level

Player Skills
Players need to be sharp in playing the game so that they will not lose points or minimize the loss of points to its minimum. Memorising the kit on how to play the game is very important as it could improve their focus, quick to recall, and understanding patterns.

Authority
The player in this game has the option to adjust the game's volume or to immediately quit. They are able to play the game at their own pace and comfort level. The application contains an exit button and setting that allow the user to customize the game to their preferences.

Clear Goals
Each move a player makes will be accompanied by a clear statement of the game's goals. The player will benefit from having a sense of purpose and focus as a result. It enables them to stay on course and comprehend what they must do in order to advance in the game. The goal of one of the levels is shown in Figure 7.

Figure 7: The instruction to choose the right order of tools to shower the cat.

Feedback
A total score screen in this game shows how many points the player has earned. The game is more engaging when there is a score screen at the end. Players can return often to attempt to surpass their prior records. The score screen that displays the player's final scores is depicted in Figure 8 of the article.

Figure 8: The total score gained from the game

Immersion
Interactions should closely resemble real-world actions to establish immersion. Include physics, animations, and sound effects that are realistic. Users should be able to see the fur move and hear a light rustling sound when they brush a virtual cat. They should pay attention to the pleasing click sound and the lifelike clipping animation when trimming nails.

E.   Usability Test Result and Analysis
To determine whether the goals have been reached, usability tests were conducted. Through usability testing with the target audience, quantitative data on usability issues or difficulties and device performance (such as usefulness, user-friendly, ease of use and the user's satisfaction) were gathered. A survey in the form of a Google Form was delivered to 33

participants, both male and female participated for the usability testing of the "Cat Grooming" game.

Getting more information and knowledge
The findings demonstrate that all respondents, 100% of them completely concur that the game can increase their knowledge because, prior to playing it, they had no idea how to properly groom a cat. However, following play, they claimed to have gained some understanding of the subject. The application effectively disseminates knowledge related to cat grooming practices. The interactive tutorials provide detailed explanations of various techniques, supplemented by text, animations and sound that aid understanding.

Usefulness and Time Saving
33 respondents, or 97%, agreed that the game is very useful, while the other 2 respondents said that the game is average and falls short of their expectations for usefulness. 30 respondents said the game fulfils their needs to groom cats, while three others thought it was simply average. Since they are knowledgeable about appropriate cat grooming, 93.9% of respondents felt that this game can save them time; nonetheless, 6.1% of respondents thought the game saved their time on average. The application demonstrates high levels of usefulness, effectively addressing the primary goal of enhancing users' knowledge of cat grooming practices. The interactive tutorials, virtual pet simulation, and real-world challenges provide valuable hands-on experiences that align with users' learning objectives.

Ease of use and User Friendly
93.9% of the respondents agreed that the game is easy to use and other 6.1% chose moderate. 97% of the respondents admit that this game is easy to understand, while 6.1% of them averagely understand the game and the knowledge given in the game. 97% of the respondents agreed that the game is user-friendly whereas 3% did not agree that the game is user-friendly. It shows that "Cat Grooming" application excels in terms of ease of use, catering to both novice users and those familiar with grooming practices. The step-by-step instructions and interactive elements guide users through each grooming technique, ensuring that they can follow along comfortably. In addition, the application's user-friendly design is evident through its intuitive interface, clear navigation pathways, and logical arrangement of features. The well-labelled buttons, descriptive icons, and consistent design elements contributed to a seamless user experience, even for those with limited technological expertise.

Satisfaction and Interesting
33 respondents, or 93.9%, said they were satisfied with the game, while 6.1% said it was generally pleasurable for them to play. The majority of respondents, 31 or 93.9% decided that the game is highly entertaining to play, while the remaining two chose moderate. 97% of respondents said they truly like the game's general design, while 3% thought it was average. Users appreciated the engaging and gamified learning approach, which kept them motivated and excited to explore various grooming techniques. The virtual pet simulation resonated well with users, fostering a sense of accomplishment and connection as they successfully groomed virtual cats.

Improvement
87.9% from 33 respondents stated that the game does not need an improvement. The explanation given by respondents is that the game typically satisfies user needs. According to 15.2% of the respondents, the game requires further upgrades because the levels' variety. In addition, the respondents wanted the game to have more interactive elements, such as minigames, side games, or quests.

The usability analysis of the "Cat Grooming" game-based learning application revealed its strong performance across key usability metrics, including knowledge dissemination, usefulness, user-friendliness, ease of use, and user satisfaction. The application successfully combines gamified aspects with instructional content to produce an engaging and effective platform for learning about cat grooming. The research shows that usability principles have been successfully implemented, but ongoing user feedback and iterative adjustments will further refine the application's usability and guarantee a continually gratifying experience for users looking to increase their cat grooming abilities and knowledge.

Conclusion
In conclusion, the adoption of game-based learning principles in the realm of cat grooming practices presents a promising avenue to bridge the gap between theoretical knowledge and practical application. "Cat Grooming" represents a breakthrough in enhancing knowledge and skills related to cat grooming practices. The game provides interactive and engaging learning experiences that help users understand the basic steps of grooming a cat, including nail trimming, bathing, and brushing. By combining the allure of gaming with comprehensive educational content, the application offers an engaging and effective learning experience. With a focus on safety and well-being, "Cat Grooming" represents an exciting step forward in creating a knowledgeable and proficient community of cat caregivers who are equipped to provide the best care for their cherished companions. Top of Form
For future enhancements, this application can incorporate with many different aspects. Other cat breeds should be included in place of domestic shorthair housecats, adding more grooming practices like wiping cat's ears and eyes, and increasing the number of platforms on which the game is playable, as opposed to just desktop.

References

McDonald, S. E., Sweeney, J., Niestat, L., & Doherty, C. (2022). *Grooming-Related Concerns Among Companion Animals: Preliminary Data on an Overlooked Topic and Considerations for Animals' Access to Health-Related Services*. Frontiers in Veterinary Science, Vol. 9 https://doi.org/10.3389/fvets.2022.827348

Eckstein, R. A., & Hart, B. L. (2000). *The organization and control of grooming in cats*. Applied Animal Behaviour Science, 68(2), 131–140. https://doi.org/10.1016/S0168-1591(00)00094-0

Emilisa & Darmakusuma, R. (2020). *Virtual Pet Game Application to Train and Manage How to Raise a Cat Well and Properly*. 6th International Conference on Interactive Digital Media, ICIDM 2020, 1-7, https://doi.org/10.1109/ICIDM51048.2020.9339682

Zhonggen, Y., Mingle, G., & Lifei, W. (2020). *The Effectiveness of Educational Games in Improving Learning Outcomes and Student Motivation*. Journal of Educational Computing Research. Sage Journal. Vol. 59. Issue 3. https://doi.org/10.1177/0735633120969214

Li, Y. (2021). *Educational Game Design Based on Experiential Learning Theory*. 9th International Conference on Information and Education Technology, ICIET 2021, 190–193. https://doi.org/10.1109/ICIET51873.2021.9419600

Stella, J. L., & Croney, C. C. (2016). *Environmental Aspects of Domestic Cat Care and Management: Implications for Cat Welfare.* The Scientific World Journal, Hindawi Publishing Corporation, Vol. 2016, 1-7, https://doi.org/10.1155/2016/6296315

Vandercruysse, S., Vandewaetere, M., & Clarebout, G. (2012). *Game-based learning: A review on the effectiveness of educational games.* In Handbook of Research on Serious Game as Educational, Business and Research Tools (pp. 628–647). IGI Global. https://doi.org/10.4018/978-1-4666-0149-9.ch032