Evaluation Plan for Kingston's Review Adventure

Mitchell B. Camfield

School of Education, University of Cincinnati

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Dr. Janet Zydney & Dr. Gi Woong Choi

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Abstract

Kingston's Review Adventure is a small project and introductory educational video game quickly produced in my spare time. Unfortunately, because it was created so hastily, it did not have the privilege of undergoing critical review and analysis. Using the evaluation plan detailed in this paper, I will take an academic approach to reforming this shoddily produced video game into a bona fide piece of educational content. Through the critical review of a capable sample population, I will uncover the usability, desirability, and accessibility problems plaguing this artifact. Since this is intended to be an educational video game, those three aspects of user experience will be most critical review will ask evaluation participants to think aloud as they navigate through the game for the first time. Afterwards, they will get the chance to reflect on the game without distraction and aid in the reforming of *Kingston's Review Adventure* in accordance with the IDT8130 course timeline. Ultimately, this artifact will be displayed on my professional online portfolio to be defended in front of other instructional designers and my peers.

Keywords: educational games, video games, usability, usability questionnaire assessments, think aloud assessments

Evaluation Plan for Kingston's Review Adventure

Kingston's Review Adventure was originally created to provide the students in the graduate clinical management course at the University of Cincinnati's (UC) College of Nursing a well needed study break as they prepared for their fourth exam in the course. The instructor of the course approached me to inquire if there was anything I could do to support her students as many of them were complaining of burnout. Among other things, one of the solutions that we devised was to create a review game for the exam. With this review game, we hoped that we could motivate students to continue studying with the aid of an adorable corgi named Kingston and his courageous plight to run through an open field.

Kingston's Review Adventure follows a pixelated corgi who is attempting to escape through an open field (as any corgi who finds the opportunity will do). If the user answers a review question correctly, Kingston will advance through the field. But, Kingston will be unable to advance through the field if the user answers the review questions incorrectly. This review game is accompanied with a soundtrack and artwork so that the user can be more immersed in the *Kingston* game universe. This game was created with the intention of supporting students as they studied for a test, rather than completely supplementing the process of studying. If a student has been hitting the books for several hours and would like to test their knowledge in a lowstakes, corgi-filled environment, then they can turn on this review game for support.

A questionnaire, in a tight time constraint, was created for the students in the clinical management course in order to gauge if the implementation of this review game was truly helpful. I found that it was difficult to draw conclusions from the survey results as my survey questions were created as an afterthought after programming for several nights in a row. The feedback that I would like to garner using this evaluation plan is if other game and learning

design professionals consider *Kingston's Review Adventure* as conducive to student learning and usability so that students are engaged to continue playing the game until completion. Additionally, I am using instructional and game designers as evaluators to ensure that I have designed a game without frustration and, overall, can review their criticisms of this artifact.

Audience

The intended audience for *Kingston's Review Adventure* is high-school students or older. I have an initial restriction to the age limit for this game because it was originally created with graduate college students in mind. The game board can be large, with room for a total of 30 questions. Additionally, tutorials were not created for this game with the assumption that the menu and gameboard would be intuitive enough for an adult college student to quickly understand how to navigate the game. These design considerations are not as accessible for a younger audience.

After this initial evaluation of this artifact, different versions of the game can be created for younger audiences with the addition of extended tutorials for ease of use and the option for smaller gameboards to curb shorter attention spans. I intentionally chose a universally beloved protagonist, a corgi, so that users of all ages would enjoy the adventure. At the moment, the game is deceptively relatable to all ages, as the soundtrack, protagonist, and gameboard are all "age neutral". However, it is missing essential features that would make it accessible to a younger audience.

Game Design

Upon clicking the URL to *Kingston's Review Adventure*, users are brought to the game's main menu, where they meet the protagonist, a corgi named Kingston (Figure 1). The menu

presents the user with a few simple options: the user can click the "Directions" button for a simple explanation of the game, they can click the "Credits" button to learn more about the game designer, the game's artists, and the music selection of the game, and they can click on the "Start" button to begin the review game. Additionally, the user can turn the accompanying in game music on or off depending on their particular tastes.

Figure 1

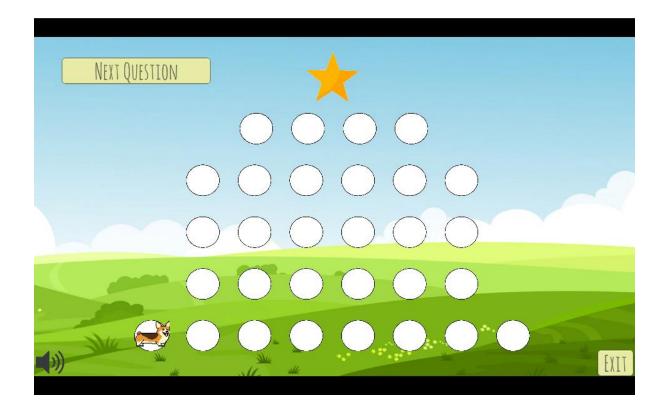
The main menu of Kingston's Review Adventure.



When the user clicks the "Start" button on the main menu, they are brought to the game board (Figure 2). On this game board, the user has a few options. The user can select the "Exit" button to return to the main menu, they can toggle the in-game noise on or off, or they can begin or continue playing the review game using the "Next Question" button. Once the review question appears, the user can make their answer choice selection. If they choose the correct answer, Kingston jumps to the next tile and lets out a celebratory bark. However, if the user chooses the incorrect answer, Kingston remains in place and lets out a whimper. The game will continue asking questions until either the game is completed or the user exits the game, so the user will always be able to help Kingston get to the final tile despite the number of review questions that they answer incorrectly. If the user brings Kingston to the final tile of the game, a celebration will ensue.

Figure 2

A maximum-sized game board of Kingston's Review Adventure.



Evaluation Methodology

To properly evaluate the design of this artifact for user learning and motivation, I will be collecting data from game and instructional designers using a combination of usability questionnaires and thinking aloud exercises. I will first ask my participants to think aloud as well as record their screen while they play through *Kingston's Review Adventure* so that I can understand how my participants navigate the artifact. By gathering data from users who have had no influence on the development of a game, I am able to gather genuine and novel feedback on how users perceive and interact with the game. Afterwards, I will have the evaluation participants complete a questionnaire to elicit quantitative feedback concerning the design of the game. I want to incorporate the usability questionnaire as a component of this evaluation plan since usability is often given a smaller role in game design and testing heuristics (Pinelle at al., 2008). Because of this, the usability of games are often neglected by game developers who have a stronger focus on engagement and fun. While designing for these elements are important, the design of usability is necessary to create a successful game as well.

I am using these two methods of data collection for a few reasons. First, it is important to collect both qualitative data to understand what users *think* they know about the game and collect quantitative data to assess the users' *actual* behavior. There can be a large discrepancy between these two behaviors, so it is important to assess both types of data to draw reasonable conclusions regarding the artifact (Nielsen, 1993, pp. 209 - 210). Ng, Khong, and Nathan (2018, p. 2) have found that the use of multiple assessment methods will result in more reliable data, which validates that this method of data collection will be helpful in determining if *Kingston's Review Adventure* is aligned to its true purpose as a fun and relaxed study game. The analysis of the data from these two assessment methods will provide vital feedback on artifact revision.

The participants evaluating this review game will be purposeful and convenient evaluators. Because of the strict timeline for extracting user evaluations, I will be choosing participants who either have experience with game design or who design instruction for education. I will be garnering results from other instructional and game design professionals since the feedback I would like to procure is concerned with the design of the artifact to facilitate learning and motivation rather than the user response that the artifact has on learning and motivation.

The Importance of Usability

Different types of video games will elicit different kinds of emotional reactions from their participants. Some games are designed to challenge players, others are designed to provoke connections from people separated by large distances, and a few are created with the intention of having the user learn something new. Despite the intention of the game, all rely on one crucial concept: usability (Sears & Jacko, 2009, p. 224). If a user cannot navigate a game, then its purpose will be obstructed by poor design. Therefore, this evaluation plan will largely be dedicated to measuring this artifact's usability.

For *Kingston's Review Adventure*, the user will need to be able to navigate through the initial menu of the game as well as tasks presented while playing the game. If the user experiences difficulties navigating these essential components of the game, then they will lose motivation to interact with and complete the game (Sears & Jacko, 2009, p. 225). To visualize first-hand how new users interact with the usability of this game, I will task my evaluators with completing the game as if they were a learner playing the game as a homework assignment or in the classroom. I will record the footage of my participants playing the game and then evaluate the footage to assess if they are able to navigate and play the game as intended. While doing this,

my evaluation participants will also be tasked with thinking aloud so that I can gather their realtime feedback of the game.

As has been discussed earlier, usability is incredibly important in maintaining engagement and motivation levels within videogames (Sears & Jacko, 2009), which is why it deserves its own category. Desirability, the "appreciation for the power and value of... elements of emotional design" (Morville, 2004, para. 4) and accessibility, the design of products for those with disabilities, are closely related to usability. An educational video game would not be desirable to students without an emphasis on emotional design for engagement. Additionally, an educational video game would not be tolerated if it were inaccessible to students with disabilities or students with limited technology access. These three categories are necessary for the development of an educational video game, and thus qualitative data will be interpreted and organized through their lenses.

To elaborate further, I am testing the design of *Kingston's Review Adventure* as a game and instructional tool. By focusing on the usability of this artifact, I can construct a fluid game and learning experience that can be accessible for my target audience. Since I want to garner this information, it would be advantageous to elicit data from game and learning professionals rather than random participants from my target audience.

Testing Usability: Thinking Aloud

The first part of my evaluation will task participants with playing through *Kingston's Review Adventure* without direction or instruction. While playing through the game, participants will be asked to think aloud while playing to garner real-time feedback on their reaction to the game and its design. This real-time information elicits process data, which are the "observations of what the test users are doing and thinking as they work through the tasks" (Lewis & Rieman, 1993, p. 82). Through these observations, I can observe my participant's patterns and behaviors as they navigate through the artifact.

Using the thinking aloud method of testing allows for the collection of a *wealth* of qualitative data (Nielsen, 1993, pp. 195 - 196), which could prove vital given the low number of evaluators and the short timeline of data collection. Collecting this data is essential for understanding how users feel about certain aspects within the game, which is important in insuring that the game is both usable and provokes the intended emotional reaction from the player.

Testing Usability: Questionnaires

Upon completing the thinking aloud component of the usability evaluation, evaluation participants will have a few minutes to play *Kingston's Review Adventure* without being recorded and without my presence. Once time is up, the evaluation participants will be presented with an online copy of several usability questions. A large amount of critical incidents and feedback will most likely be reported during the thinking aloud usability evaluation, but the usability questionnaire allows the user to formulate feedback without my intervention, without the distraction of the game on their screen, and without the need for elaboration. The use of closed questions and Likert scale answer format provide an easy method to gather and quantify responses.

Throughout the information age, thousands of different versions of usability questionnaires have been developed by academics, corporations, and government organizations to properly assess products. Due to the short timeframe of this evaluation, it would be best to select a few questions from a developed, functional usability test that has been tried and refined several times over. Additionally, I will be choosing general experience usability questions that have strong interconnectedness between measurement categories. This means that an efficient questionnaire can be produced by using a small number of questions that collect data for multiple aspects of the artifact. The questions I have selected are from the *USE* (Usability, Satisfaction, and Ease of use) *Questionnaire* developed by Arnold Lund (2003) and are shown to have strong interconnectedness (Appendix C). The measurement categories in the *USE Questionnaire* are usefulness, ease of use, ease of learning, and satisfaction.

Evaluation Instruments

The thinking aloud and usability questionnaire evaluations contrast greatly in terms of what preparation is required to successfully evaluate participants. This is most likely due to the nature of the data being collected from each of these assessments in the evaluation plan. The thinking aloud portion requires the evaluator to react to the evaluation participant in real-time so that they can respond or coax the evaluation participant to continue to provide information. The questionnaire requires complete development beforehand as proper questions need to be vetted, refined, and readily available to the participant before beginning the evaluation appointment. Although considerable preparation is necessary, the evaluator will be able to gather a large amount of incredibly helpful data for the artifact.

To complete the evaluations, my evaluation participants will require access to a computer that can support either Cisco Webex or Microsoft Teams. This computer will also need to be able to support a web game created through the Unity3D game engine and distributed through a website hosted by GitHub. Since my sampling population will be game and instructional designers at the University of Cincinnati, I do not foresee any of my participants not having the required technology. This is especially true since the evaluation participants in my sample population will most likely be students or staff at the University of Cincinnati, who were required to have this technology available to continue work and school amidst the COVID-19 pandemic.

Evaluation Instrument: Thinking Aloud

While the evaluation participants are thinking aloud during their initial playthrough of *Kingston's Review Adventure*, they may need to be continuously prompted to think aloud by using guiding questions. Coaching the participant should be avoided, especially if they ask questions that would instruct them on how to use objects in the game. Generally, I will avoid coaxing the evaluator to use different parts of the game, as their silence regarding certain items is just as valuable (Nielsen, 1993, p. 197). If necessary, I will only ask general, non-guiding questions to the participant solely for the purpose of continuing to have them think aloud.

The instructions for the participants in this phase will be simple and straightforward. The participants will be given directions such as, "Tell me what you are thinking about as you work." or, "What are you thinking now?". By prompting the participant in this way, I can continuously gather information and remind the participant to share their thoughts throughout the game. More examples and non-examples for guiding questions can be found in Appendix B.

Finally, I will be monitoring evaluator's screens and recording their feedback using either Cisco Webex or Microsoft Teams. There is no clear benefit in using one software over the other, and both are chosen exclusively for their convenience for both me, the evaluator, and the evaluation participants. Both tools are supported by the University of Cincinnati and are used by students and employees on a regular basis due to the ongoing pandemic. Since all my evaluators attend class and/or work for UC, these tools will fit the needs to conduct this evaluation.

Evaluation Instrument: Questionnaire

Following the think aloud portion of the evaluation plan, participants will be given a few minutes to play *Kingston's Review Adventure* by themselves before completing the final section of the evaluation. The evaluation questionnaire will be composed of questions gathered by Arnold Lund (2003) in their *USE Questionnaire*. The *USE Questionnaire* has many general usability questions that can be composed into short, general surveys.

Since the usability questionnaire must be developed before the evaluation period, it would be better to ask general questions about the game's usability rather than try to predict specific usability questions. Attempting to predict specific usability issues for the usability questionnaire is not advisable for in this evaluation for several reasons. The first reason is that an evaluation of this artifact has not been conducted before, so specific issues with usability and user experience have not been flagged yet. Predicting these specific issues and including them on my usability questionnaire before receiving reliable data may narrow the scope of feedback received from the usability questionnaire, resulting in the loss of feedback from areas outside of this scope. Secondly, the usability questionnaire will intentionally be given to the evaluation participant before data from the think aloud portion of the evaluation can be synthesized. This means that like the first reason listed above, specific issues have not been flagged yet which prevents the creation of specific usability questions. Finally, the think aloud portion of the evaluation typically results in users verbalizing their major misconceptions of the artifact and will elicit specific usability feedback (Nielsen, 2003, p. 195). Since specific usability feedback will *probably* be ascertained from the think aloud portion of the evaluation, it would be

redundant to include specific usability questions in the usability questionnaire and would be more advantageous to only include general usability questions.

The evaluations will be conducted virtually using the Microsoft Forms software. Once evaluation participants have finished playing the game after the think aloud section of the evaluation, a link to the usability questionnaire will be sent to them to complete. I will refrain from viewing results from the questionnaire until data collection is complete to ensure anonymity.

Sampling Methodology

For this evaluation, I will be using convenient, purposive sampling to select participants to evaluate *Kingston's Review Adventure*. It is almost entirely necessary to use a convenient sample of participants, as there will be an incredibly short timeframe in which to gather participants and receive feedback on my artifact. Additionally, purposive sampling will be used in order to deliberately select instructional and game designers, who hold necessary qualifications and can give vital feedback.

This combination of sampling methods is incredibly convenient but comes with its drawbacks. In my convenience sample, I will be choosing a population solely from the University of Cincinnati. Although this is convenient given the short timeframe, this population is not homogenous to the general population and excludes a diverse pool of participants (Etikan et al., 2015). This population will most likely include participants with advanced college degrees achieved from a single university, which will cause issues as these participants may hold a similar and potentially narrow range of perceptions toward this artifact. Participants who

received similar degrees from a single institution might provide less varied feedback than participants who have different learning experiences in other learning institutions.

Within this convenience sample, I will be selecting a purposive sample of instructional and game designers. Since there is not much time to collect quality data to analyze, I am deliberately choosing this sample so that I can elicit the sound judgement of peers. Purposive sampling works best when qualitative data needs to be collected since this sample is rich in knowledge and information that can be elucidated through their feedback on artifact (Etikan et al., 2015). Selecting participants through my network also ensures that I will receive a higher rate of return for feedback and secures a sample that would be ready to test *Kingston's Review Adventure*.

Analysis Procedures

My data analysis procedures are inspired by the British Design Council's (2005) Double Diamond idea, which creates a framework to assess usability feedback to develop product solutions. The Double Diamond is composed of four sections: discover, define, develop, and deliver. I will be "discovering" issues within this game through usability testing, and then "defining" those issues according to themes that emerge from the feedback. Finally, I will "develop" potential solutions for each of these issues and then "deliver" feasible resolutions.

Once the evaluation appointment has ended, I will watch the videos of my participants playing the game, transcribe each of their think aloud comments in another document, and crossreference those comments with the notes that I took during the appointment. If the participant's comment does not align with their behavior during the game, then I will document these observations in the document. Additionally, I will color code the feedback by participant to visualize if multiple participants encountered the same issue (Lucero, 2015).

After listing all the participant's feedback, I will parse through the document and look for themes that emerge by coding the feedback. Coding is useful as a method to label the participant's feedback so that it can be organized into meaningful groups (Mortensen, 2020). Once the feedback has been coded, I will group the feedback within the document according to these themes that develop. Since the feedback will be color coded, I will be able to see how certain themes affected different users. If multiple users experienced the same issue and thus their feedback was organized into the same theme, then I am able to identify the issues that are the most prevalent in *Kingston's Review Adventure*.

Once the issues are coded and prioritized, I will identify the items in the game responsible for generating the feedback so that I can devise possible solutions. The list of possible solutions among the problematic game items will then be ranked by their feasibility of completion within the short timeframe of the course. The process of categorizing the participant's feedback, ranking their urgency, and brainstorming and prioritizing potential solutions enables me to improve this game as efficiently as possible within the time constraints of the course.

Timeline

The timeline of data procurement, analysis, and artifact revision will largely follow the course schedule set for the IDT8130 course. Table 1 helps illustrate project delivery dates throughout the 2020 fall semester:

Table 1

Project Deliverable Dates

Date(s)	Project Deliverables
August 31 st – September 13 th	Complete first draft of evaluation plan.
September 14 th – September 27 th	Complete second draft of evaluation plan
	after receiving feedback from peers.
September 28 th – October 4 th	Begin conducting evaluation of participants.
	Have all evaluations complete by October 4 th .
October 5 th – October 11 th	Organize, analyze, and interpret data collected
	from participants.
October 12 th – October 18 th	Complete first draft of artifact evaluation
	report.
October 19 th – November 1 st	Complete second draft of artifact evaluation
	report.
November 2 nd – November 8 th	Complete revision of artifact based on
	findings and evaluation.
November 9 th – November 15 th	Complete online professional portfolio.
November 15 th – November 23 rd	Revise professional portfolio and prepare for
	defense.
November 24 th	Defend portfolio.

Conclusion

Kingston's Review Adventure will be one of several artifacts included in my e-portfolio. This evaluation plan, the synthesis of the collected data, and the revision of this artifact will be presented to my peers during our instructional design showcase. During this presentation, I will list the artifact's flaws, the improvement of those flaws, and why fixing these issues is important for designing an effective game for learning. The completion of this evaluation plan is the first major steppingstone in finishing the last course of the Master of Education degree in Instructional Design and Technology at the University of Cincinnati. After the submission and approval of this evaluation plan, I will collect data to be analyzed. Once analyzed, and evaluation report will be developed which details the user feedback, how it was analyzed, and how I will revise *Kingston's Review Adventure*. The revised version will be added to my e-portfolio to prepare for my final portfolio assessment and presentation to peers during the instructional design showcase.

In this evaluation plan, I have detailed the inspiration for and design of *Kingston's Review Adventure* within the context of learning. This artifact was my first major project in designing games for learning, and its evaluation will undoubtedly produce copious amounts of feedback criticizing its elementary design. The creation and implementation of this evaluation plan is incredibly helpful in learning about game design and will serve as a template for future evaluations for my educational game creations. Much of the research cited in this evaluation plan are applicable to games in general and serve as fantastic introductory reading materials for designing and evaluating games. I hope for this evaluation plan serves as a reference for those beginning to design games for learning and for my future evaluations of educational games.

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Appendix A

Beginning the Think Aloud Evaluation Section

To begin the evaluation of *Kington's Review Adventure*, I will ask you to please navigate through the game at your leisure while continuously thinking out loud. As you navigate, please tell me what you are thinking about the game as you use it. As a reminder, it is the game, not you, the user, that is being tested. During this evaluation period, I will be recording your screen and your audio feedback so that your reactions can be further analyzed.

During this evaluation period, I will be available for questions and will occasionally offer prompts for feedback. Please keep in mind that, in an effort to prevent coaching, I may not answer all of your questions. When you are ready to begin, you may click on the link and begin using and evaluating *Kington's Review Adventure*.

*Note: Once the user opens the game, it is usually best to begin with a general feedback question. This will encourage the evaluation participant to begin talking and will set the tone for the evaluation period.

Appendix B

Guidance Phrases

Examples of Useful Phrases for the Evaluator (Nielsen, 1993, p. 197), (Lewis & Rieman,

1993, pp. 84 - 85)

- "Tell me what you are thinking."
- "Keep talking"
- "How do you feel right now?"
- "What are you thinking now?"
- "What do you think this message means?" (after it is clear that the user has noticed the referenced message)

Examples of Phrases that Should Not be Used (Nielsen, 1993, p. 197), (Lewis & Rieman,

1993, pp. 84 - 85)

- "What do you think of [specific item in the artifact]?"
- "What do you think those prompts mean?"
- "What do you think this message means?" (before the user has noticed the referenced message)

*Note: if the evaluator is asked a question from the evaluation participant, the evaluator should not answer the question. Questions are encouraged as they give valuable real-time feedback from the user but should not be answered as they coach the participant on how to use the game.

Appendix C

Usability Questionnaire

Please respond to each question by choosing a rating between 1 (strongly disagree) and 7

(strongly agree).

		Strongly Disagree						Strongly Agree			
Question #	Question	1	2	3	4	5	6	7			
1	I can use the game without written instructions.	0	0	0	0	0	0	0			
2	I learned to use the game quickly.	0	0	0	0	0	0	0			
3	It is simple to use the game.	0	0	0	0	0	0	0			
4	The game works the way I want it to work.	0	0	0	0	0	0	0			
5	It is fun to use the game.	0	0	0	0	0	0	0			
6	I am satisfied with the game.	0	0	0	0	0	0	0			
You may provide further comments regarding your responses to the above questions in the area below.											
Comments:											

Revision Notes

Title page: Revised to adhere to APA 7 format.

Abstract: Added keywords.

Page 6: Revised title and APA formatting of Figure 1.

Page 7: Revised title and APA formatting of Figure 2.

Page 8: Added research backing up claim that game developers often overlook usability in their titles.

Page 9: Clarified and explained why I was choosing a purposive, convenient sample of learning and game designers versus a random sample of the target audience of my artifact.

Page 11: Went into more detail concerning the use of interconnected usability questions.

Page 13 - 14: Explained why asking general usability questions are better than asking specific usability questions for the questionnaire for this evaluation plan.

Page 17 – 18: Added conclusion section.

In-text citations: Added reference pages for large works, quotations, and paraphrases.

Appendices: Revised formatting to adhere to APA 7 format.