



THE ART OF SERIOUS GAME DESIGN

A hands-on workshop for
designing educational games

**Ryerson
University**

**The Chang School
of Continuing
Education**

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Preface

Welcome to *The Art of Serious Game Design* facilitator guide.

This facilitator guide has been created by the Digital Education Strategies (DES) team at The G. Raymond Chang School for Continuing Education at Ryerson University, based on empirical research conducted by Ryerson University, George Brown College and Centennial College in Toronto, Canada.

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Special thanks to the Digital Education Strategies team for their support in coordinating the research activities and production of this guide, including instructional design, web development, video production, and editing.

Sincere gratitude to the workshop participants who invested time, energy and creativity in shaping the workshop and this guide.

We hope that the guide will help to facilitate the process of game design for your teams. We would appreciate any feedback from your experiences in facilitating or participating in workshops using this guide.

— Naza Djafarova, Director of Digital Education Strategies, The Chang School,
Lead Researcher

About This Guide

This guide is designed to serve two purposes:

1. Provide a conceptual framework to guide game design within multidisciplinary teams in higher education.
2. Share resources and an approach to facilitating a participatory workshop focused on the pre-production phase of the game development process.

The guide consists of two key sections:

1. Introduction to the conceptual framework.
2. Planning, facilitation and resources for a participatory game design workshop.

The materials within this guide are intended to support multidisciplinary teams in or during the pre-production phase of serious game design as they collaborate in a facilitated workshop. It is critical that the workshop facilitators are familiar with the conceptual framework and proposed methodology in order to better support participants as they collaborate in the game design brainstorming and prototyping steps.

You can choose to use the workshop to familiarize your team with the game design process. In this case, a generic game topic is selected prior to the workshop by the facilitators in order to allow non-expert input from participants. Alternatively, you can use the workshop to ideate and brainstorm a topic assigned to the game design team.

The [brainstorming demonstration video](#) provides an overview of the methodology used in this guide.

I. Approach to Serious Game Design

The Game Development Process

Research shows that serious games promote increased student engagement and motivation for learning in higher education (e.g., Arnab et al., 2015; Iten & Petko, 2016; Hamari et al., 2016). Ideally, serious game development teams will include subject-matter experts (faculty, instructors, industry experts), instructional designers, game developers, script writers and graphic designers. However, the diversity of viewpoints and experiences among these design team members may present challenges during the design process.

The game development process consists of three phases (see Figure 1):

1. The **pre-production phase**, during which brainstorming among team members takes place, leading to the design of a paper prototype of the game;
2. The **production phase**, when the game is developed; and
3. The **post-production phase**, during which the game is tested and refined before being offered to learners.

This facilitator guide focuses on the pre-production phase, identified by the research team as one of the most under-investigated and challenging areas of serious game design (e.g., Aleem et al. 2016).



Figure 1 .The three phases within the game development process.

The Art of Serious Game Design Methodology

The methodology behind *The Art of Serious Game Design* is an adaptation of the Design, Play, and Experience (DPE) Framework, developed by Brian Winn (2009). The DPE framework was designed to provide a formal process to guide game design, a structure to analyze serious games, and a uniform language for teams to discuss game design (ibid., p. 1020). After testing the DPE framework with a multidisciplinary game design group, the research team recognized the value of adapting the DPE framework to help make the game design process more fluid. The testing stage also showed that the framework helps to enrich brainstorming, as it allows for a productive dialogue among design team members and more opportunities for iteration.

The Art of Serious Game Design Conceptual Framework

The *Art of Serious Game Design* conceptual framework, anchored in the Design, Play, and Experience Framework, is depicted as a circle and divided into four equal quadrants (see Figure 2), each representing a different but equally important game element:

Learning, Storytelling, Gameplay and User Experience¹. The components within each of these game elements are connected with double-ended arrows, representing iteration and the interconnectedness between the framework's layers. Below is a description of each of the four game elements:

1. **Learning** refers to the content to be learned by players through the game with specific and measurable learning outcomes.
2. **Storytelling** refers to the background story of the game and includes a description of the character(s), the setting, and the ultimate goal of the game.
3. **Gameplay** refers to the way in which the player interacts with the game, or with other players (if a multiplayer game). It encapsulates the type of activity (e.g., puzzle, trivia, etc.) found in the game.
4. **User Experience** refers to the player's emotions and attitudes while playing the game, as well as how the player interacts with the game.

Similar to the DPE framework, The Art of Serious Game Design conceptual framework "depicts the relationship between the designer and the player" (Winn, 2009), where:

1. The innermost **Design** layer symbolizes the designer's "story," or all the elements that the designer introduces to the game that will allow the player to play the game. According to Winn (2009), the designer has direct control only over the design.
2. The middle layer, **Play**, which symbolizes the "mediated experience" between the player and design input through play, is influenced by the design and the player's background brought into the play experience.
3. The outermost **Experience** layer symbolizes the varying play experiences that players can have depending on their backgrounds, as well as the choices and actions made during game play.

1. Technology is an additional game element that is not included in the methodology above but is an important consideration. It has been intentionally left out to avoid restricting the design team's creativity during brainstorming.

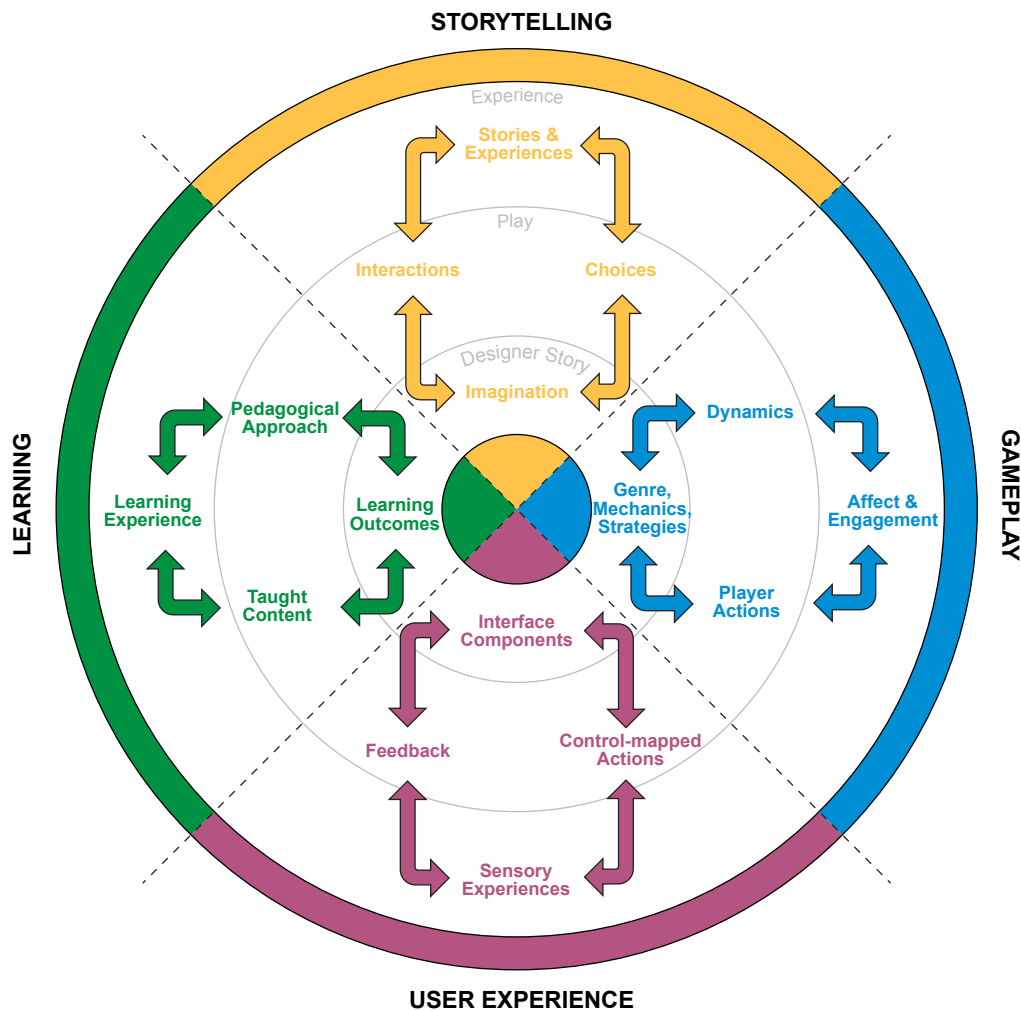


Figure 2 .The Art of Serious Game Design methodology circle.

II. Brainstorming for Serious Game Design – A Participatory Workshop

Workshop Flow and Group Composition

The pre-production phase of the game development process includes idea generation and game design, which take place in three stages (see Figure 3). The workshop starts with an introduction to *The Art of Serious Game Design* methodology with all workshop participants. This is followed by Brainstorming Part 1, during which subjectmatter experts and instructional designers work together to generate ideas about the game. This time is used for an extended discussion related to learning outcomes (the rest of

the participants can engage in an alternative discussion). This stage is then followed by Brainstorming Part 2, where game designers, game developers, project managers and any other assigned team members join the subject-matter experts and instructional designers and continue the dialogue about the design of the game. In the final stage, the entire team collaborates to create a paper prototype.

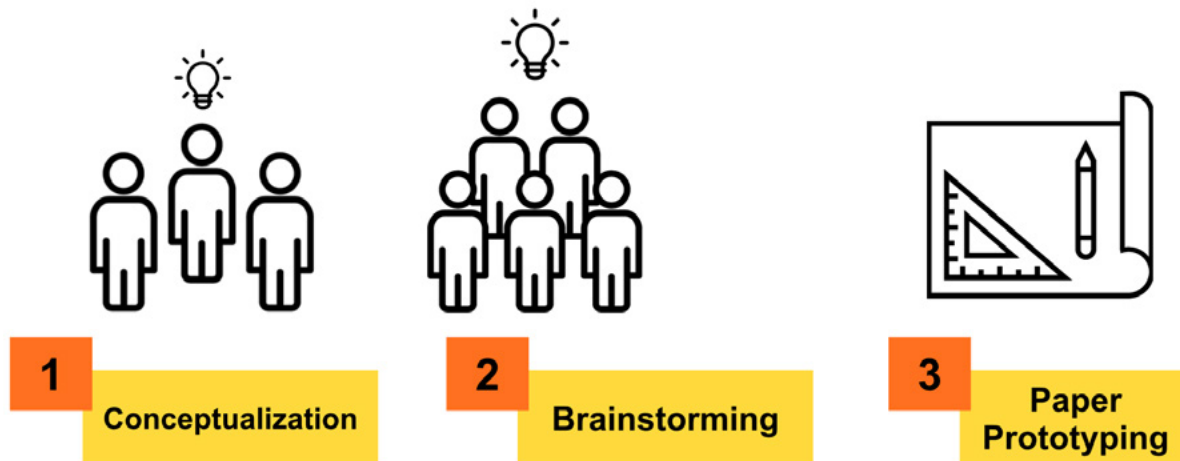


Figure 3 .The three stages in The Art of Serious Game Design methodology.

Brainstorming and Prototyping During the Workshop

The Art of Serious Game Design methodology helps teams with diverse experience in serious game design to engage in guided brainstorming using ideation cards that contain questions to be answered by the design team.

Workshop participants work with two decks of cards, each representing the respective stages of brainstorming. Cards with a solid border are used for Brainstorming Part 1, and cards with a striped border are used for Brainstorming Part 2 (see Figure 4). The titles and colours on the front of the cards match those of the four core elements of serious game design in the methodology circle (learning, storytelling, gameplay and user experience).

You can download and print the ideation cards to be used in the workshop (please refer to Resource 2).

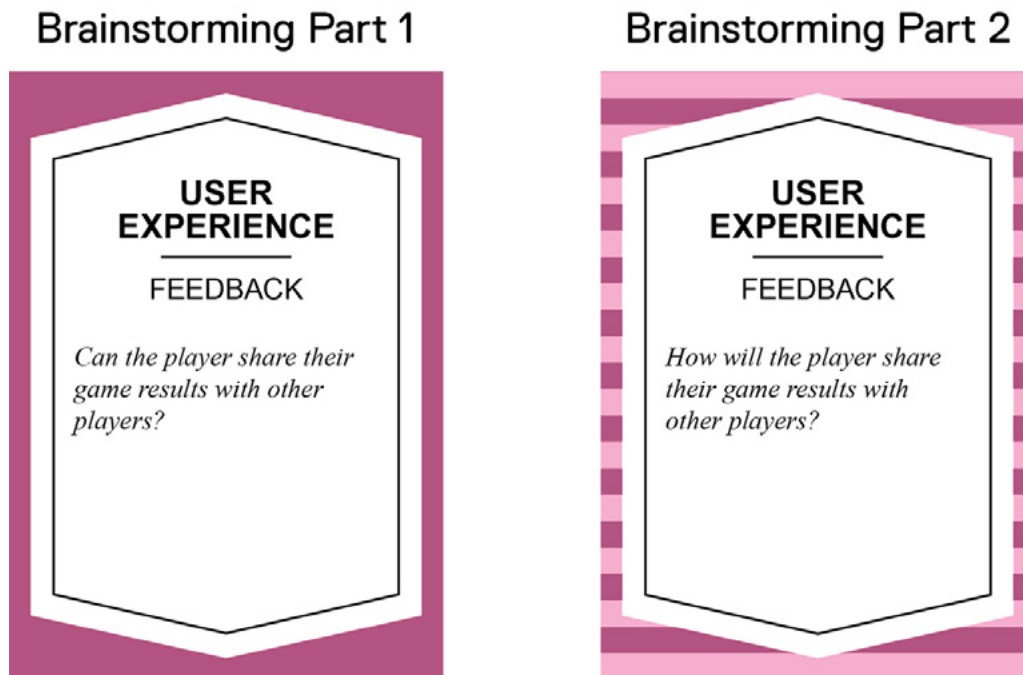


Figure 4 .Ideation cards for the gameplay element within *The Art of Serious Game Design* card deck.

Idea generation: Brainstorming Part 1

The workshop facilitator distributes *The Art of Serious Game Design* deck of cards for **Brainstorming Part 1** (with solid borders), along with the accompanying glossary, to the team of subject-matter experts and instructional designers. The facilitator instructs the group to select one team member to take on the role of reading the card questions and another team member to record (scribe) the answers from the group. As the cards are drawn, each question is read out loud and the answers are discussed within the group. Once in agreement, the scribe writes the group's response to the question on a sticky note whose colour corresponds to that of the quadrant of the methodology circle it represents (see Resource 2). The note is then placed on that quadrant, as shown in Figure 5. The goal of this session is for team members to answer as many of the questions as possible.



Figure 5 .The methodology circle used to document the team's brainstorming.

If the team cannot answer the question(s) on a card, then the card can be placed at the bottom of the deck and another card can be drawn; the team can return to the unanswered card at a later time. Cards can be chosen randomly, and it is suggested that no more than two cards from the same category (element) are drawn in a row. After the team has answered the question(s) from a card, they can place it in a separate pile in order to avoid mixing them with unanswered cards.

It is important that the facilitator reminds the team to use the glossary (see Resource 1) to help establish a common understanding of the terminology (the bolded terms on the cards correspond to the glossary). They can also consult [Bloom's Taxonomy of Learning](#) to help set learning outcomes.

Idea generation: Brainstorming Part 2

Following Brainstorming Part 1, game designers, developers and the rest of the team join the initial group to begin Brainstorming Part 2. The team of instructional designers and subject-matter experts are asked to brief the new team members about the game ideas they came up with, by talking them through the notes on the methodology circle.

Facilitators should then provide the group with *The Art of Serious Game Design* deck of cards for **Brainstorming Part 2** (with striped borders).

As in Brainstorming Part 1, one team member should take on the role of card reader and another the scribe. As the cards are drawn, each question is read out loud and the answers are discussed within the group. The goal is to answer as many of the questions as possible. Once in agreement, the scribe writes the group's response on a sticky note whose colour corresponds to the quadrant of the methodology circle that it represents. The note is then placed on that quadrant.

If the team cannot answer the question(s) on a card, then this card can be placed at the bottom of the pile and another card can be drawn; the team can return to the unanswered card at a later time. Cards can be chosen randomly, and it is suggested that only two cards be drawn from the same category in a row. As the team answers the questions from each card, they can place those cards in a separate pile in order to avoid mixing them with unanswered cards. Teams may find that some of the questions on the Brainstorming Part 2 cards are similar to ones from the Brainstorming Part 1 cards. This is intentional, as it allows iteration to take place.

Again, the team should be encouraged to use the glossary (see Resource 1) to help establish a common understanding of the terminology used in the card questions.

After the brainstorming is complete, the team should discuss technological considerations for the game¹ (see Resource 3 for a list of questions).

This will further clarify what is realistic for the game in terms of budget and time, and will highlight technological limitations. It will also allow for additional iterations.

Designing a paper prototype

In the final step, Paper Prototyping, the facilitator instructs the group to create a paper prototype of the game. One person can be selected to draw the prototype. Below are some examples of paper prototypes from previous workshops (see Figure 6).

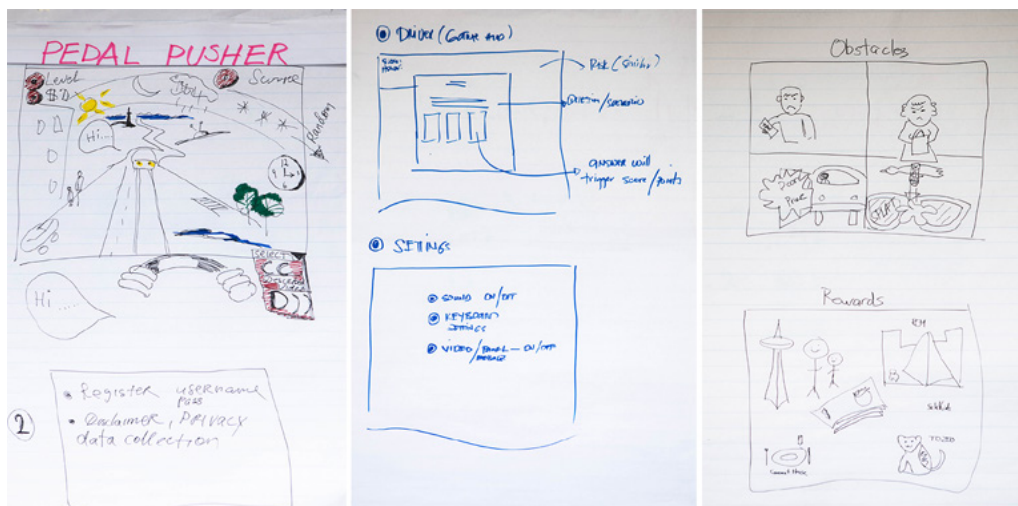


Figure 6 .Examples of paper prototypes.

1. Teams can write their ideas on sticky notes that are a different colour than the four that correspond to the methodology circle, and consider if these change anything in their game. If they do, adjustments to the brainstorming ideas should be made.

Facilitating a Participatory Workshop for Serious Game Design

Workshop format and group composition

See Resource 2 for a sample workshop agenda. For an effective workshop, it is ideal to include all roles within the design team, e.g., subject-matter experts, instructional designers and game developers. The game design workshop group can have as few as three participants and, ideally, should not exceed ten people. The workshop can include multiple design groups provided that a facilitator is allocated to each group.

Materials

The following is a list of suggested materials for the workshop:

1. The Art of Serious Game Design cards (grouped into decks for Brainstorming Part 1 and 2)
2. The Art of Serious Game Design methodology circle
3. Sticky notes (in colours corresponding to the quadrants of the methodology circle)
4. Pens/pencils
5. Flipchart paper
6. Markers

Conclusion

After a paper prototype is created, the team should debrief. You may choose to assign a note taker for each team within the workshop to capture all details that were not necessarily included in the prototype, which can help in the game development later. We suggest that the team revisits the brainstorming notes periodically during game development to ensure that the learning outcomes align with the game design. Further iterations can take place using the same methodology outlined in this workshop, as needed.

Resources

Resource 1: Glossary

[Download the Glossary as a PDF.](#)

360-degree video refers to an immersive video where the player is presented with a panoramic view of a location, mimicking the experience of being physically present in that location.

Academic content refers to subject-specific material that is based on a given curriculum.

Accessible refers to ensuring the player is provided with sufficient means to interact with the game, e.g., providing visual cues for players with hearing impairments or auditory cues or high contrast for those with visual impairments.

Actions refers to the things the player does during gameplay.

Background characteristics refers to characteristics, such as gender, appearance, occupation, age, etc., as well as any strengths, weaknesses, dreams and achievements the characters may have.

Backstory refers to the background story of the game. This can be communicated using text, video or audio, through dialog with cut scenes, interactions with objects in the world, etc. It can be provided at the beginning or throughout the game.

Curriculum refers to the planned academic content to be taught in a course of study.

Characters are actors in the game. The main character is the character controlled by the player and the secondary characters are those encountered in the game.

Emotions refer to the feelings and sensations evoked in the player during gameplay, e.g., a sense of achievement, control, power, weakness, adventure, etc.

Feedback refers to the information that tells the player how they are doing in the game. It can be communicated either after the player performs an action or at particular intervals in the game (e.g., telling the player how to perform actions or displaying their status levels, giving hints, etc.).

Game controls are any devices used to perform an action or navigate within a digital game, e.g., mouse, keyboard or joystick (simple or with haptic feedback). In mobile devices, game control activities are performed by touch.

Game's world refers to the real or fictional setting where the game takes place, i.e., location (indoors, outdoors, on earth, in space, etc.). Games typically have multiple settings.

Gameplay data refers to any information about the player's behavior that is collected during play.

Goal refers to the ultimate aim or objective of the game.

Interact refers to verbal or non-verbal communication with characters and objects such as tools, doors, vehicles, etc.

Knowledge refers to understanding and learning of content (e.g., facts, concepts, information).

Learning challenge refers to typical difficulties encountered by the learner during the learning process.

Learning outcomes are statements that describe what a learner should know or be able to do within a defined learning context. Please see the handout on Bloom's Taxonomy of Learning for a list of action verbs and activities that can help to formulate learning outcomes.

Levels refers to particular sections in the game and include predefined tasks that the player should complete in order to progress through the game.

Mini-maps refers to visual cues that are provided to the player to show their location within the game's world.

Motivates refers to strategies built into the game to engage the player. For example, the difficulty may be adjusted as the game progresses, the player may be provided with powers or power ups, etc.

Player refers to the game's participant (or a target audience). For example, in serious games, this could be a group of high school, undergraduate, postgraduate or continuing education students.

Plot refers to the defined narrative of the game, e.g., the events unfolding in the game that lead to the game's goal. There are usually a main plot and subplots within a game.

Progress reports refers to data that the game generates to let the player know how they are doing.

Senses refers to the five senses and the associated emotional reactions that are evoked in the player. For example, when considering the senses in the storytelling, is there any background sound specific to this world? What is the weather and temperature? How does the air smell?

Skills refers to the player's ability to do something well.

A story refers to the narrative of events in the game. There could be one or multiple stories in the game. The actions and choices of the player can lead to different stories.

The way stories unfold could be communicated through a narrative at the beginning, segments across game levels, or after a specific task or milestone has been achieved.

Teaching approaches refers to the specific pedagogical strategies included in the game, e.g., problem-based and experiential learning.

Type of game refers to a predefined category that best matches the game, e.g., a fantasy game, a shooter game, a puzzle, etc.

Type of world refers to the historical and social contexts of the game's world, e.g., a prehistoric world, an underwater kingdom, a fantasy world, etc.

Resource 2: Workshop Resources

Click on links below to download workshop resources in PDF format:

1. [Brainstorming Part 1 Questions](#)
2. [Brainstorming Part 2 Questions](#)
3. [The Methodology Circle](#)
4. [Bloom's Taxonomy of Learning](#)
5. [Sample Workshop Evaluation Survey](#)
6. [Sample Workshop Agenda](#)

Resource 3: Technological Considerations

1. How will you ensure your game is accessible to diverse learners?
2. Will the player be presented with any 360-degree video perspective in the game?
3. For what duration will most players ideally play the game?
4. Will the game be integrated into other platforms (e.g., an LMS)?
5. Is this a single or multiple-player game?
6. Will players need to create a profile or sign in to play the game? Will you collect gameplay data?

Resource 4: Brainstorming Demonstration Video

[Watch video on YouTube](#)

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