QuizGenerator: A Mobile Configurable Platform to Generate Quiz and Storytelling Games

Victória Oliveira Gomes, Victor Travassos Sarinho
Universidade Estadual de Feira de Santana (UEFS)
Laboratório de Entretenimento Digital Aplicado (LEnDA)
Feira de Santana, Bahia, Brazil
victoria.oliveiragomes@gmail.com, vsarinho@uefs.br

***Abstract*—As the game importance in our society is growing, is quite useful to provide an easy way to develop games. In this sense, and taking into account the simplicity and popularity of games in the quiz and storytelling format, this paper presents the QuizGenerator. It is a game platform able to generate storytelling and quiz games by *JSON* configurations, where the developer does not need to have a high degree of programming knowledge.**

***Keywords*-QuizGenerator; game production; configurable games; storytelling; quiz;**

I. Introduction

Characterized as "domains of contrived contingency, capable of generating emergent practices and interpretations, being intimately connected with everyday life to a degree heretofore poorly understood" [1], games are making an evident and increasingly relevant impact on our society, whether being digital or not [2].

Per digital games, they are "designed to generate a positive affect in players and are most successful and engaging when they facilitate the flow experience" [3]. They also "constitute a tremendously varied set of applications" [4], which are divided into various genres and subgenres currently available.

Regarding the storytelling genre, it is defined as an "approach that allows a judicious analysis of previous taken decisions, considering different courses of a story in case another perspective was adopted" [5]. Moreover, for quiz games, they can be defined as a game to test the player knowledge about a certain subject, helping knowledge acquisition as a result [6].

Although this game categories are used for different purposes, they have a very similar structure and mechanics system, as both present a multiple choice question system that should be answered. However, in the quiz model there is at last a correct answer to be selected, and, in the storytelling model, all answers are correct but showing different story possibilities when selected to achieve the game/story end.

Per software reuse, it is defined as "the systematic practice of developing software from a stock of building blocks, so that similarities in requirements and/or architecture between applications can be exploited to achieve substantial benefits in productivity, quality and business performance" [7]. The purpose is to improve the productivity and the quality of a software, "because people want to build systems that are bigger and more complex, more reliable, less expensive and that are delivered on time" [8].

Considering the software reuse benefits, and the current popularity of storytelling and quiz games, this paper describes the development of the **QuizGenerator**, a gaming platform capable of generating quiz and storytelling games through configurable files and without a high degree of programming knowledge.

II. Related Work

Games that are "created using multimedia technologies permit constructive, situated and experiential learning as a result of active experimentation and immersion in the game" [9]. Following this idea, QuizTEA [10] was designed as a game that aims to help autistic children to develop consciousness about the linearity of things. It is a game developed in a graphic quiz format [11] using Godot 3.0, an open source game engine that covers important resources in the development of 2D and 3D games. The codification of the QuizTEA game was used as a foundation to the QuizGenerator, with some modifications and code additions to promote a software reuse — a strategy in which software development is based on the reuse of pre-existing software [12].

Regarding quiz modeling tools, AsKME [13] is a feature-based product line that can configure quiz games to run in cross-platform environments, such as chatbot, desktop, web, mobile and Arduino, as well as be adapted to execute storytelling and casual game genres. On the other hand, the "Generalized Platform for Creating of Testing Games" [14] is a virtual platform where it is possible to follow student advances by defining a quiz, whose questions must have at least one answer. Moreover, for the storytelling modeling field, a system to generate and promote 3D story interaction and visualization on interactive TV [15] was also provided, which is based on an integrated environment to control the generation of dynamic interactive stories,

III. Methodology

QuizGenerator was developed as a tool in which the game developer can easily set up a storytelling or game quiz with few programming skills required. It is an adaptation of static code parts of the QuizTEA [10] game that are responsible to load the multimedia game resources and define the game characteristics, such as title and background music, for example.

When the game developer opens for the first time this mobile app, it will see the screen shown in Figure 1, presenting the title screen, instructions about how to start it, and action buttons to get and load the game configuration. To configure the game, it is necessary to provide a *JavaScript Object Notation* (JSON) file by clicking on **"Carregar arquivo"** (the **"Load file"** option).

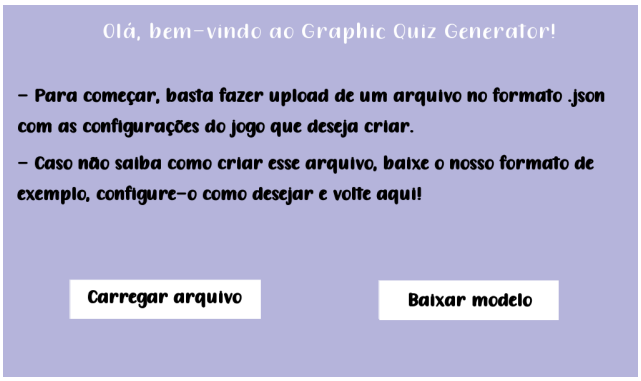

Figure 1. QuizGenerator initial screen.

JSON is defined as a "lightweight, text-based, language-independent data interchange format that defines a small set of formatting rules for the portable representation of structured data" [16]. This file format was chosen because it is simple to edit and to find "native support in almost every modern programming language" [17]. Furthermore, this file format "was designed to be maximally efficient and human readable, and is capable of representing complex data structures with little overhead" [17], making it suitable for the purpose of developing a simple configurable application.

By using the *JSON* file, the game developer must define specific game information, such as game title, game stories, story connections, and so on. It is also able to define the title screen image, the game color pallet and the path to a background sound, but this is not required at all since default values are applied for these characteristics. Figure 2 illustrates an initial execution of a configured demo game by QuizGenerator, showing the game title together with *Start*, *Instructions* and *Credits* buttons.

If the game developer does not have the game configuration file, or does not know how to assemble all necessary information to configure the game, it is possible to download an initial model by clicking on **"Baixar modelo"** button

Figure 2. Initial game screen loaded by QuizGenerator.

(the **"Download model"** command in Figure 1). Next, using a desired text editor, the game developer can modify the initial model to represent your own *JSON* configuration file according to the desired game design. It is also important to complete all *JSON* information exactly as shown in Figure 3, allowing the QuizGenerator to properly read and start up the desired game.

Regarding the *JSON* file configuration, multimedia resources can be used to configure the desired storytelling or quiz game (Figure 3). The **"goTo"** field is responsible to differentiate these two game types, which, when empty, indicates that the game is working as a quiz, and, when completed, indicates that exists a storytelling card to be shown. If the game developer wants to end the storytelling, it puts the **"end"** word in the **"goTo"** field. The **"answer"** field should be completed only if the game developer is setting up a quiz, where it must put the number of the correct option (1 or 2, for example) to be selected by the player.

It is also important to emphasize that, until now, for each *JSON* file, it is possible to set a maximum of 3 stories. Moreover, after setting up a game, if it was closed by the player, it is not necessary to load the *JSON* file again. Since it has be done once, the game already has the path to load the necessary resources.

IV. Obtained Results

Regarding the QuizGenerator gameplay, and considering the graphical quiz/story configuration, each quiz/story window will present a question and two stacks of polaroid pictures associated or not with a textual description. The polaroid image format represents the game design style, and all configured images of the game will be applied to it.

To select an option, the player should make a slide down movement in a polaroid image to "answer" the proposed question. By the selected polaroid "answer", the game configuration will decide the next question/story to be shown to the player, according to configured *JSON* file. Figure 4 illustrates the graphic game model used by QuizGenerator to represent configured graphic questions.

```
{ "Game_title":"Put here your game title",
  "Background_sound_path":"Put here the path to your game background sound",
  "Title_screen_background": "Put here the path to your game background image",
  "Game_color_pattern":{"r":"", "g":"", "b":"", "a":""},
  "Stories":{
    "Story_1":{
      "Story_title":"Put here the title to your number one story",
      "Story_sound_path":"Put here the path to your story audio file",
      "Story_text_description":"Put here a textual description for your story",
      "Story_cover": "Put here the path to your story cover image",
      "Questions":{
        "Question_1":{
          "question_text": "Text of question number one",
          "option_1":{
            "image": "Path to a image that represents option_1",
            "text": "Textual description for option_1",
            "goTo": "If you're configuring a storytelling, put here to which question the player will jump to"
          },
          "option_2":{
            "image": "Path to a image that represents option_2",
            "text": "Textual description for option_1",
            "goTo": "If you're configuring a storytelling, put here to which question the player will jump to"
          },
          "answer": "If you're configuring a quiz, put here the number of the option that answer to this question"
        }
      }
    }
  }
}
```

Figure 3. JSON file example for the QuizGenerator configuration.

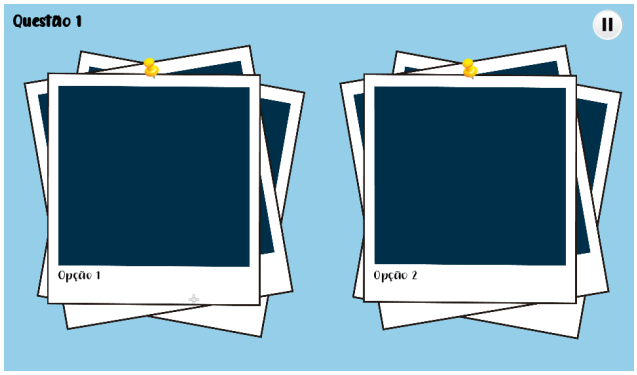

Figure 4. Graphic game model used by QuizGenerator.

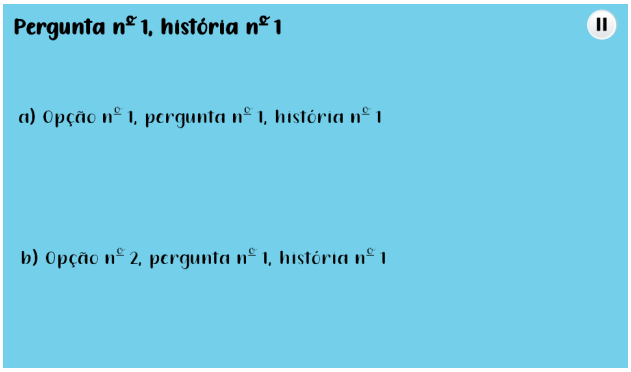

Figure 5. Textual game model used by QuizGenerator.

Per textual questions, they work just as a regular question-answer game, where the player should make a click in the alternative that seems correct to him. Both game modes have only two response possibilities, making the game interface as clean and pleasant as possible. Figure 5 illustrates the textual game model used by QuizGenerator to represent configured text questions.

As an example of QuizGenerator functionality, a graphic storytelling was implemented (Figure 6), which is based on a previous developed textual storytelling designed to help people to develop mouth cancer awareness [18].

V. Conclusions and Future Work

This paper presented the development of QuizGenerator, a mobile configurable tool that can be used to generate quiz and storytelling games. It applies software reuse concepts, integrating static structures provided by the QuizTEA game in a configurable environment able to reduce the time and

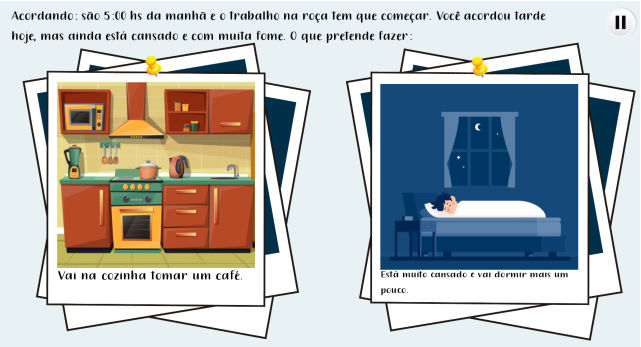

Figure 6. Developed game with QuizGenerator to develop mouth cancer awareness.

the cost to develop desired games.

QuizGenerator helps people that do not have programming skills to create their own quiz and storytelling games in a mobile version. For this, the Domain Specification Language (DSL) strategy was applied, by the definition of a simple configuration game format, that can be modified by text editors to be directly loaded in the developed tool to provide the desired game.

As future work, it is necessary to improve the support of game creation with more stories, together with the development of a graphical configuration tool and a web repository of configured games. For validation purposes, it is necessary to evaluate the gameplay usability of provided games and the production gains with game developers, in order to identify possible improvements and new characteristics to be supported by the developed tool in the future.

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