XIMPEL IN EDUCATION - INSPIRING CREATIVITY THROUGH STORYTELLING AND GAMEPLAY

S.V. Bhikharie and A. Eliëns
Business Web & Media
Department of Computer Science
Faculty of Sciences, VU University
De Boelelaan 1081
1081 HV Amsterdam
The Netherlands
E-mail: svbhikha@few.vu.nl & eliens@cs.vu.nl

KEYWORDS

ximpel, education, interactive video

ABSTRACT

The XIMPEL framework has been successfully applied in multiple educational settings (university courses, workshops for high school students and educators) to enable users to create interactive media productions. In three steps (define a story graph, prepare media items and configure the XIMPEL playlist and application) users are guided in creating their productions. By providing thematical constraints users are challenged to find a personal approach towards the creation of their production, using storytelling and/or gameplay as a practical means to apply a theme into their work. When comparing XIMPEL to (commercial) game engines for usage within education, the biggest strengths of XIMPEL are the relative ease of use and fast prototyping capabilities, while maintaining rich interaction possibilities. Guided by ongoing technological advances, a HTML5 based version of XIMPEL is in active development, with the intention of making the framework even more accessible for both desktop and mobile platforms along with more users, targeting increasingly educational applications as developed for our courses in serious games.

INTRODUCTION

Since its inception in 2007, the XIMPEL framework for interactive media has been applied in multiple educational settings, namely in workshops and university courses. The workshops are given within the time span of 2 hours in which the participants create a short interactive video using the XIMPEL player. The participants for these workshops have varied from high school students and university students to educators and colleagues at conferences.

The university courses where XIMPEL is used are currently given at VU University Amsterdam and University of Twente. These courses are 4 or 8 weeks long and students have multiple deliverables they must present to their fellow students, including an interactive media production using the XIMPEL framework. For both workshops and university courses, we have defined guidelines in the form of three steps to help users create their XIMPEL productions:

1. Define a story graph
2. Prepare media items
3. Configure the XIMPEL playlist and application

structure The structure of this paper is as follows. We will first discuss the three steps that guide users in creating a XIMPEL application. We will then explain how thematical constraints can help shape a narrative structure, followed by a comparison of XIMPEL with game engines to point out its strenghts, closing off with future research and development.

DEFINING A STORY GRAPH

A story graph is a directed graph that specifies the navigational structure for a story. If a node in a graph has two or more branches, it is a choice within the story. In the context of an interactive production, these choices form the basic building blocks.
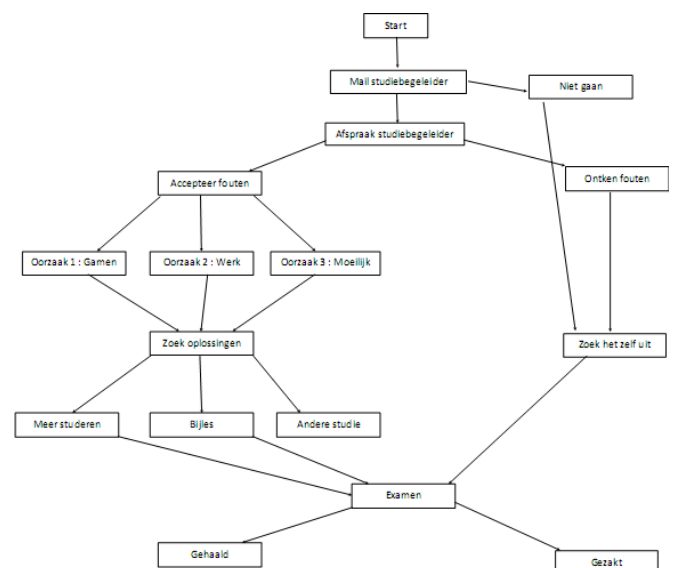

Figure 1: Story graph with multiple branching choices

By adding branches to a story graph, the number of nodes grows exponentially. To reduce the number of nodes, it can be useful to have multiple nodes leading to the same node.

Cycles within a graph can be useful if you want to enforce a certain choice: you will keep looping (within a select number of nodes) until you make a choice that leads you out of the cycle, forcing the player to explore its possibilities in order to advance.

End nodes (nodes without outgoing branches) can be used to give closure to a certain set of made choices. Due to its non-linear nature, a graph can contain more than one end node, which can increase the replay value and in turn increase the player's involvement.

PREPARING MEDIA ITEMS

When preparing media items for usage within a XIMPEL production, the Internet provides a vast amount of content, which can be found and/or edited with relative ease. At the other end of the spectrum, creating your own content is a viable option as well. Whether this is done with a high end video camera, video capturing software/hardware or the built-in camera of a smart phone, the advantage is that the user has more control over the produced output. Either way, the nodes defined in the story graph act as a rough checklist for the media items that will need to be produced.

The XIMPEL player has built-in support for three media types: picture, video and YouTube. The picture type is a static image, with support for jpeg and (transparent) png files. The video type supports h264 mp4 (recommended) and flv (legacy) videos. It should be noted that the picture and video media types can be used for both offline and online XIMPEL applications. As a rule of thumb for online usage, it is recommended to keep the file sizes for these media types as small as possible, since this content will need to be downloaded progressively through your web browser.

When using larger video files, the YouTube type is a suitable alternative for using videos within XIMPEL. These videos are remotely hosted on the YouTube servers and directly streamed into the XIMPEL player.
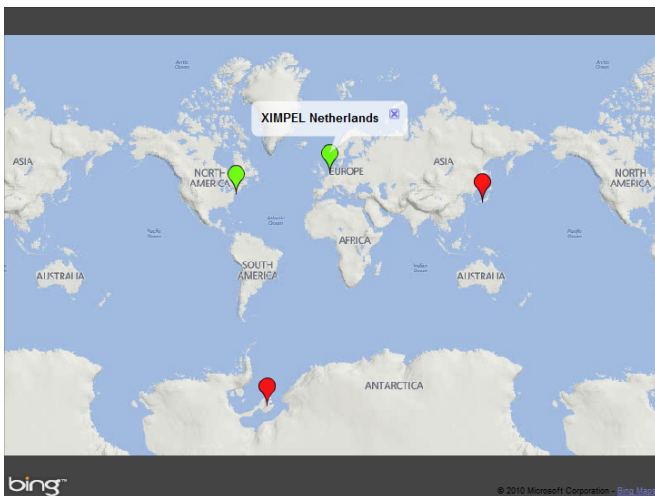

Figure 2: Custom XIMPEL media type using Bing Maps

Apart from the built-in media types, it is also possible to add custom media types, like audio, geographical maps or even minigames. This requires some additional work in the form of programming an extension for the XIMPEL player, but there are no further restrictions on how a media type should look or behave, greatly increasing the expressivity and possible interactions.

CONFIGURING THE PLAYLIST AND APPLICATION

To get started with the XIMPEL playlist, a package containing the XIMPEL application must first be downloaded from the XIMPEL download section[1]. This package is available as a basic and advanced version. With the basic package, the user can immediately get started with creating a playlist with an already compiled application. The advanced package contains a library and source code for the XIMPEL application and allows for customizations and extensions.

```
<ximpel>
    <subject id="0">
        <description>
            Make a choice
        </description>
        <media>
            <picture file="1.png">
                <canvas>
                    <overlay x="190" y="140"
                      width="120" height="420"
                      leadsto="1a"/>
                    <overlay x="970" y="140"
                      width="120" height="420"
                      leadsto="1b"/>
                </canvas>
            </picture>
        </media>
    </subject>
    <subject id="1a">
        <description>XIMPEL</description>
        <media>
            <youtube id="aUAjicsqBjE"/>
        </media>
    </subject>
    <subject id="1b">
        <description>Fast</description>
        <media>
            <video file="fast.mp4"/>
        </media>
    </subject>
</ximpel>
```

Figure 3: XIMPEL playlist where the first subject is linked to the other subjects using overlays

The playlist is specified as an XML file that is loaded by the XIMPEL player. Using the story graph as blueprint, the basic structure can be created. In figure 3 a basic playlist with three subjects is displayed.

1http://ximpel.net/downloads/

Subjects are the main building blocks within a playlist and contain a list of one or more media items. They can be linked with overlays, which are visual cues that are placed on top of a media type. When you click on an overlay, the associated subject is loaded.

Figure 4: Rendered output of the first subject of the playlist with two rectangular semi-transparent overlays

Overlays can have different shapes (rectangular or elliptical) and can be filled with either a (transparent) color or an image as background, in combination with a snippet of text. The XIMPEL documentation section[2] provides a more exhaustive list of options for building overlays and playlists.

Apart from the playlist, the application itself can also be configured using a configuration XML file. Some of the options include changing the title, authors and splash image for the application, allowing users to give a finishing touch to their XIMPEL application.

THEMATICAL CONSTRAINTS

Even when presented with the functional means to create a XIMPEL application, users must first be challenged and subsequently inspired before they are able to tell their (interactive) story. By providing thematical constraints, the users are forced to think about what story they want to tell.

Some examples of themes we have used in the past are a guided tour through the university, a tour of Amsterdam, environmental issues, ethical frameworks, mathematical games and dealing with feedback. Although we do not strictly enforce the themes, most users tend to choose the themes as a starting point and give these themes their own spin, often resulting in surprising, funny, endearing and even serious results.

By systematically applying (thematical) constraints in a narrative and providing a proper feedback loop, the interaction can be greatly improved by creating an engaging, game-like experience. In the case of an ethical framework as constraint, as described in Bhikharie & Eliens (2013), the player is confronted with and recognizes moral dilemmas through the narrative and must actively engage them by making choices and seeing the consequences of these choices, which is discussed in Sicart (2013).

2http://www.ximpel.net/documentation

COMPARISON WITH GAME ENGINES

XIMPEL goes hand in hand with the term *poor man's immersion*, meaning that it makes use of immersive realism of videos and images as a poor man's substitute for interactive 3D immersion, as can be experienced in for example games and virtual reality applications. We coined this term in reference to the climate game described in Eliens et al. (2007).

The trade-off being made is directly related to the cost of development. A 3D game engine like Unity or Valve's Source requires a relatively big investment in time and knowledge to get started, let alone to create a world populated with 3D models and program the necessary game logic and behaviours.

From our own experiences in developing a masterclass game development for high school students using the Source engine, as described in Eliens & Bhikharie (2006), we have seen that to make a 3D engine accessible for users with no prior experience, a decent amount of preparation is required.

In our case, we made a modified non-violent version of the Half-Life 2 multiplayer mode, together with a partial virtual recreation of the VU University as an introductory playground to get acquainted with the 3D game world and engine. We furthermore prepared a template level with the level editor of the Source SDK (Hammer), along with instructions how to get started with simple level editing and creating custom textures for surfaces.

Although the students were able to produce their own levels with relative ease and the produced work was certainly visually creative, it was limited in its interaction, only allowing you to walk around.

With XIMPEL we wanted to create a media framework that is easy to use and allows to quickly create a working prototype, while still allowing rich interaction.

By using the XML standard as foundation for the playlist, we specified a human-readable format that can be easily understood and authored, without the need for complex tools. Furthermore, since the playlist is the minimal amount of input needed to create a XIMPEL application, getting an application up and running can be accomplished in a matter of minutes.

Using a story graph as a blueprint for interaction, the application can reach its full potential by transforming the graph into a full-flegded XIMPEL playlist. By using custom media types and applying thematical constraints, it is possible to further enrich the interactions.

FUTURE RESEARCH AND DEVELOPMENT

When we started with the development of the XIMPEL framework in 2007, we chose for the Adobe Flex SDK as our main implementation platform, allowing us to programmatically create Flash SWF files with built-in

support for the (then popular) FLV and MP4 video formats with no extra cost and enabling usage of XIMPEL applications both offline and online, giving us a user base of everyone who uses a desktop computer with a Flash Player plugin enabled web browser. Over the years, powerful mobile devices like smart phones and tablets have become more prominent. Since these platforms lack support for the Flash Player, we felt the need to look at potential alternative technologies that allows us to deploy the XIMPEL framework onto these platforms as well, in addition to the current Adobe Flex implementation.

The most effective technology available that caters to both desktop and mobile devices is HTML5 (in combination with JavaScript). Over the years, HTML5 has matured in both its specifications and browser implementations. Especially mobile devices have adopted it as one of their default technologies for their browsers, independent of the software stack (Android, iOS, Windows etc.) that it might run. By developing a HTML5 based version of XIMPEL, we have the potential to reach everyone using a modern and up-to-date web browser, independent of their mobile or desktop platform.

Furthermore, a HTML5 based XIMPEL offers possibilities to directly connect with JavaScript based applications and APIs, allowing for new interaction possibilities. These developments also lead us to target increasingly educational applications as developed for our courses in serious games.

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