



Education  
Services  
Australia

## **Use of HTML 5 in digital learning resources**

### **Conversion of a Flash-based digital resource to HTML5**

Report prepared by Education Services Australia Ltd

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## 1.0 Executive summary

This project has established that it is possible to replicate most of the functionality of Flash using HTML5 and JavaScript, but it comes at considerable cost and effort. An existing Flash- and ActionScript-based digital learning resource called 'Dragon's jumble: dream: three parts' was replicated using HTML5.

The developer anticipated that considerable work would be required to recreate the functionality of the Flash resource, but additional work was also required to convert the animation sequences and to integrate video and audio content in the HTML5 resource.

It has been expensive to replicate the Flash functionality in the HTML5 resource. It would have been more efficient to develop the resource using the functionality available within HTML5 rather than trying to replicate the Flash functionality. The development of HTML5 resources will become more cost effective as more JavaScript libraries become available to provide standard functions. Education Services Australia should ensure rights are retained to JavaScripts developed for us so that they can be re-used in other projects.

The success of HTML5 will depend on technology being adopted by web browsers. Until a wide range of browsers provide a consistent experience it will be difficult to justify the expenditure required to provide anything other than standard web page browsing using HTML5.

## 2.0 Background

Education Services Australia manages the National Digital Learning Resources Network (NDLRN), which consists of infrastructure and digital resources including digital curriculum resources developed under the Learning Federation initiative (TLF). Many of the digital curriculum resources have been developed using Adobe Flash software (Flash) and ActionScript programming to provide functionality that enhances interaction. The release of mobile devices such as the iPod Touch and the iPad by Apple has created a shift in the market away from the use of Flash due, in part, to the processing capacity required to run Flash and the reduced performance and battery life of the mobile devices.

HTML5 has been developed by the World Wide Web Consortium (W3C) as the next generation of the core language of the web. It is currently at a final draft stage before being published as an official standard. HTML5 has been accepted by the major web browser developers because it provides major advances in functionality, integration of authoring tools, use of styles, integration of web applications and improvements in conformance criteria to improve interoperability. It is a very broad standard that combines a number of existing standards. It is expected to be adopted as a final standard in 2012.

Integration of HTML5 functionality varies between web browsers but Internet Explorer version 9, Apple Safari version 5, Google Chrome and Firefox version 5 all support basic HTML5 functions and are integrating additional functions in each release.

Education Services Australia undertook the conversion of an existing Flash-based interactive digital curriculum resource into an HTML5-based resource to investigate the adoption of new technologies for digital learning resources<sup>1</sup>. The purpose of the project was to replicate as closely as possible the Flash-based resource and to have it working on a range of devices.

## 3.0 Methodology

### 3.1 Review of existing digital learning resources

A shortlist of eleven Flash-based digital resources was developed to include a range of subject areas, levels and functionality. These eleven resources were then provided to an external multimedia developer (Liquid Interactive) for review with a focus on the suitability of the resources for conversion to HTML5. This review examined the technology used and the suitability of the source files for conversion.

The review concluded that converting the images for use in the HTML5 pages did not entail any real problems, but that most of the development time would be needed for developing scripting to provide user navigation, resource functionality and support for multimedia components.

Based on the review it was decided that the 'Dragon's jumble: dream: three parts'<sup>2</sup> interactive resource would be used for the conversion. This resource uses functions such as drag-and-drop and rollover hints as well as audio and video components to provide the user with information, and the image areas used for navigation and display are large and scale well to smaller devices. It was chosen because it provides a clear user interface without complex scripting to enable progress through the resource. The intention was to use a resource that would provide a cost-effective solution based on the fact that the scripting development would be a major part of the cost.

### 3.2 Development of the HTML5 resource

Liquid Interactive was engaged to convert the learning resource and was provided the original source files, the illustrations and the audio files. The HTML5 version was required to display in Safari 5 and Google Chrome 9. The Firefox 4 browser was excluded as the implementation of HTML5 was not stable. Internet Explorer version 9 had not been released when the development commenced (February 2011).

Developing the HTML5 resource took four weeks. The major development issues related to the conversion of the animation sequences, the integration of the multimedia components and the scaling of the images.

The resource was tested using Google Chrome version 9 on a Windows XP operating system and using Apple Safari version 3 on OS X version 4 (Tiger). These browsers were chosen as they were the most reliable HTML5 compliant browsers available to perform the testing.

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<sup>1</sup> Funded through the NDLRN Maintenance Agreement on behalf of the Ministerial Council on Education Early Childhood Development and Youth Affairs (MCEECDYA)

<sup>2</sup> 'Dragon's jumble: dream: three parts' (TLF ID L7864) is an interactive digital curriculum resource suitable for supporting literacy development for students in Foundation to year 2.

### 3.2.1 Conversion of the animation sequences

The current version of HTML5 does not have the level of support for animation that can be programmed in Flash. Animation needs to be implemented directly or provided by a third party. Liquid Interactive used two JavaScript libraries to provide functionality for the resource – Google Closure and LimeJS. Google Closure provided the framework and LimeJS provided the timeline and animation controls. LimeJS could not replicate the existing animation sequences possible in Flash.

Simple linear animation transitions could be replicated, but animations such as the ‘snoring’ on the opening screen only operate in straight lines rather than along curves. Programming in LimeJS reduced the time developing the animations, and while the base functionality can be extended, time constraints did not allow Liquid Interactive to fully replicate this functionality.

### 3.2.2 Integration of multimedia components

HTML5 has introduced a new <video> element to provide additional video capability within a browser. This worked well with videos that were stand alone but there were issues with getting videos to operate in sequence. No solution was found that would ensure a smooth transition between videos. Different video formats had to be provided for the resource to display in different browsers. This added to development, testing time and to the size of the resource.

Different formats of audio files are also supported by different browsers and the reliability of the browsers between operating systems results in some audio failing to play. This appears to be an issue with the browsers. Having two different formats of audio also increased the size of the resource.

### 3.2.3 Scaling of images

The source files were provided to Liquid Interactive as vector files but it was not possible to create all of the complete animation sequences from these vector files. Liquid Interactive had to extract some animation sequences from the Flash files and these images were raster files that could not be enlarged without loss of quality.

To ensure that the quality of the images was not adversely affected, the scaling of the images was restricted. The result has been that the images will not scale clearly when used on larger monitors.

### 3.2.4 Other issues

#### *Accessibility*

The resource has not been developed to meet WCAG 2.0 requirements although it could meet the requirements with additional work. Keyboard navigation has been included into the game parts of the resource. The browsers provide top level tab functions with varied success as some browser navigation functions are included in the standard tabbing cycles.

#### *Variations in display*

There are some small sizing, position and colouring differences between the Flash and HTML5 versions. Users familiar with the Flash resource would also notice differences in treatment of focus items and item states that could not be converted directly to HTML5.

## 4.0 Conclusions

HTML5 is new technology that is still very immature and not yet supported by a large user and developer base. Browser support is patchy at best on the new browser and non-existent on older browsers. Development is being driven by advances in mobile technologies in which Flash suffers because of its high processor and power usage.

HTML5 does offer the prospect of matching Flash functionality in a standard web browser. The scripting involved in matching the functionality is time consuming and expensive. A number of scripting libraries will become available to provide core functionality but it will take some time for these to reach the volumes required to ensure cost-effective development where animation or any navigation beyond simple icon-based systems is required.

This project has shown that it is possible to re-purpose existing Flash- and ActionScript-based resources without significant loss of functionality. It has also indicated that it would be more cost effective to design the resource from scratch with consideration of the functionality available within HTML5 rather than attempting to replicate the Flash functionality using HTML5.

## 5.0 Recommendations

HTML5 is a technology that will mature but it needs to be more widely supported by web browsers and for scripting libraries to become more comprehensive before the technology becomes cost efficient for anything beyond normal web pages.

It does offer the prospect of matching simple Flash functionality in a standard web browser. Any work undertaken using HTML5 should be limited in functionality and the requirements clearly defined within the capabilities of HTML5. Any scripting work should be strictly controlled and rights retained to the scripts as the re-use of existing scripts will provide cost-effective development of HTML5 materials.

Education Services Australia should maintain a research and development interest in HTML5. It offers the possibility of producing one solution for use on many devices and its use will increase as the browsers offer better support.