

# ARLearn

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# ARLearn

## Open source mobile application platform for learning

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**Abstract.** The paper presents and outlines the demonstration of an open source mobile application platform for designing, supporting, and evaluating mobile learning scenarios that make use of media artefacts in a specific context. The platform contains a web-based authoring environment, cross-platform mobile applications to run the scenarios, as well as tools to monitor progress and results. Besides exploring the pedagogical background, the paper describes the conceptual implementation as well as the technical infrastructure and lists the requirements for demonstrating the platform and all its components.

**Keywords.** Mobile Learning, Serious Games, Open Source, Field Trip, Demonstration

## 1 Introduction

As a result of on going technological developments and work on mobile learning applications, the authors' present ARLearn<sup>1</sup> - an open source mobile application platform for designing, supporting, and evaluating mobile learning scenarios that make use of media artefacts in a specific context. A flexible dependency mechanism enables the definition of an instructional (game) logic on top of these artefacts. The platform contains a web-based authoring environment, cross-platform mobile applications to run the scenarios, as well as tools to monitor progress and results. ARLearn offers great potential for different learning applications and has been successfully applied to support especially field trips and role-playing serious games.

## 2 Background

ARLearn allows defining instructional designs for mobile applications linking the virtual world with real world experiences. This concept is backed up by several educational theories. The anchored instruction approach [1] was developed to decrease

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<sup>1</sup> ARLearn: <http://code.google.com/p/arlearn/>

the problem of inert knowledge through the presentation of real authentic problems and the active exploration by learners. ARLearn intends to implement this core idea in linking real world situations and problems with learning support. Furthermore the theory of situated learning [2] is grounded on the assumption that learners do not learn via the plain acquisition of knowledge but they learn via the active participation in frameworks and social contexts with a specific social engagement structure. ARLearn facilitates such an authentic learning context by providing the means for immersive learning scenarios. According to [3] immersive learning is defined as learning that involves the “subjective impression that one is participating in a comprehensive, realistic experience”. This covers potentially all phases of the experiential learning cycle [4], namely concrete experience, reflection, abstract conceptualization, and active experimentation.

## 2.1 Technology

The core of ARLearn is the capability to make use of media artefacts in a specific context. The platform allows defining a (game) logic on top of these artefacts. These artefacts can hold information or add a function to the game and can be positioned on a map by providing latitude and longitude attributes. Not providing location attributes turns the item into messages that users can receive at some point in time. Within a game, an author defines these items, as well as the following dependencies between the items:

- Action-based dependencies become true once a certain game action has been triggered,
- Time-based dependencies binds a time offset to another dependency, and
- Boolean dependencies provide means to create “AND” and “OR” statements with other dependencies.

Once a game has been created, an arbitrary amount of runs can be created and played. A run defines users grouped in teams. While users play a run, they generate actions (e.g. “reading a message”, “answering a question”) and responses. This output is then managed within the realm of a run.

The ARLearn platform is based on an application infrastructure. ARLearn builds on the JAVA version of Google App Engine<sup>2</sup> using servlet, Java Data Objects (JDO), JCache and other JAVA technology. Two communication protocols for clients permit retrieving information from ARLearn. The REST based Application Programming Interface (API) features basic CRUD (Create, Read, Update and Delete) operations. Furthermore a push notification system was implemented that only sends messages to the client when an event occurred. In this notification system, each client maintains a connection and listens for messages coming from the server. The platform is complemented by a web-based authoring environment, a cross-platform mobile applications to run scenarios, as well as tools to monitor progress and results.

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<sup>2</sup> Google App Engine: <https://appengine.google.com>

### 3 Scope and results

ARLearn has been successfully applied to support especially field trips and role-playing serious games. Respective results have been reported and published in workshop and conference proceedings as well as journals, e.g. [5] and [6]. Recently the platform is also used in the context of European projects on language learning with young children and to support inquiry-based learning of adolescents.

In total two papers related to the ARLearn application platform haven been submitted to the conference. The first submission describes the design of a mobile learning game to investigate the impact of role-playing on helping behaviour. The second submission used the platform to design a pervasive intervention to increase pro-environmental awareness, consciousness, and learning at the workplace.

### 4 Demonstration

In the context of the conference demonstration interested users will be able to explore all tools and existing scenarios created with the application platform, e.g. a field trip to explore cultural and architectural highlights of a city, a serious game for young children learning languages, a thematic tour in a museum, and a role playing scenario to train emergency situations. Besides the existing scenarios, a showcase explaining the functionality and approach of the platform itself as well as the related case studies and designs submitted to the conference can be experienced under guidance of the corresponding authors. Furthermore it will be possible to trial recent developments, such as mobile authoring or ambient information visualization.

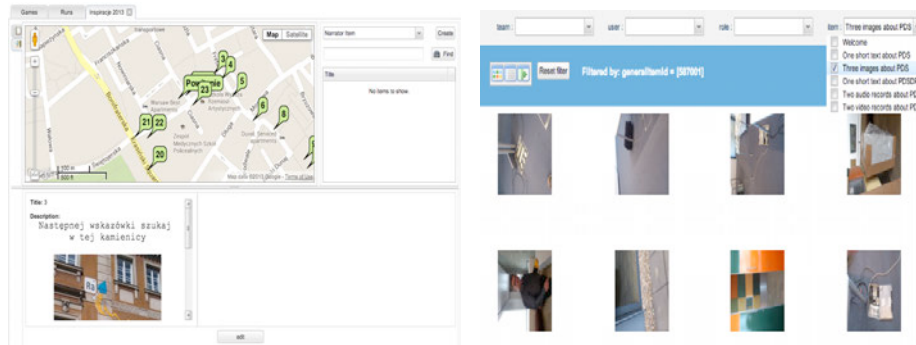


Fig. 1. ARLearn game authoring (left) and results display (right)

The demonstration will illustrate how authors can create new games (see Fig. 2 left). Via a web based authoring tool, users can create games and can add users to a game play. As soon as game players upload answers or data (e.g. pictures, video, etc.), one can use the ARLearn Results Display (see Fig. 2 right) to monitor student progress. This web based tool enables filtering as well as navigating through the results of a game play.



**Fig. 2.** ARLearn mobile application

The demonstration will showcase the different tools accompanied by a number of mobile devices to showcase the mobile application. The mobile application is currently only available for Android (Version 2.2 or higher). The application can be downloaded for free via the Google Play Store. In the context of the conference demonstration interested users can either download and install the application on their own devices or interact with the application on a limited number of demonstration devices. Figure 2 shows the mobile application for Android.

## 5 References

1. Bransford, J.D., Sherwood, R.D., Hasselbring, T.S., Kinzer, C.K., Williams, S.M.: Anchored Instructions: Why we need it and how technology can help. In: Nix, D., Spiro, R. (eds.) *Cognition, Education and Multimedia: Exploring ideas in high technology*, pp. 163-205, Erlbaum, Hillsdale (1990)
2. Lave, J., Wenger, E.: *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, Cambridge (1990)
3. Dede, C.: Immersive interfaces for engagement and learning. *Science*. 323(5910), (2009)
4. Kolb, D.A.: *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall, Englewood Cliffs (1984)
5. Gonsalves, A., Ternier, S., De Vries, F., Specht, M.: Serious games at the UNHCR with ARLearn, a toolkit for mobile and virtual reality applications. In: Specht, M. Sharples, M., Multisilta, J. (eds.) *Proceedings of 11th World Conference on Mobile and Contextual Learning (mLearn 2012)*, pp. 244-247, CEUR Workshop Proceedings (2012)
6. Ternier, S., Klemke, R., Kalz, M., Van Ulzen, P., Specht, M.: ARLearn: augmented reality meets augmented virtuality. Special issue *Technology for learning across physical and virtual spaces*. *Journal of Universal Computer Science*. 18(15), pp. 2143-2164 (2012)