

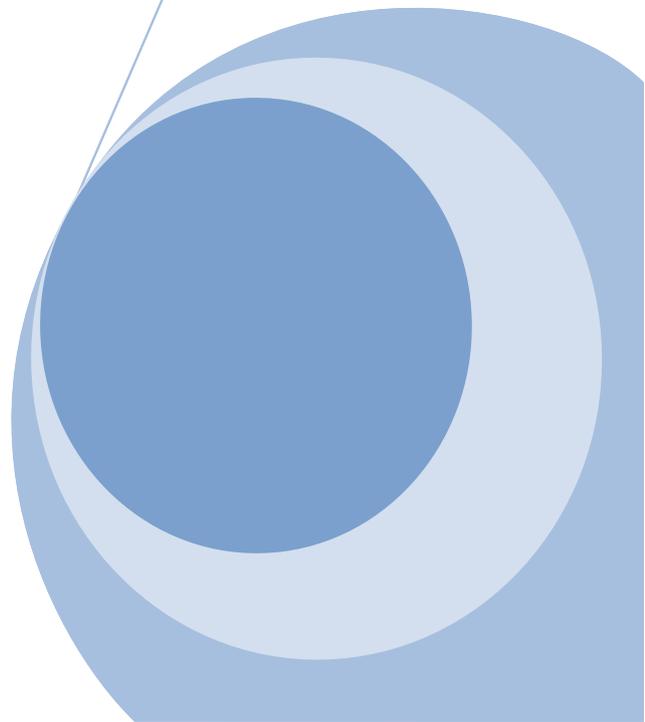
# ADULT LITERACY

FROM CREATING JOYFUL LEARNING  
EXPERIENCE INTO ACTIVE CITIZENSHIP

Trainer's Toolkit –  
Methods for Joyful Teaching  
Augmented Reality and Cognitive Loading



Lifelong  
Learning  
Programme



# Reduction of Cognitive Loading in Development of 3D Modeling Skills - a step prior to enhancement in Augmented Reality (AR) media

## Description

ICT-based learning environments and new technologies such as Augmented Reality offer a great potential and variety to make learning more enjoyable but at the same time the cognitive load imposed on learners can become an issue.

In cognitive psychology, **cognitive load** refers to the total amount of mental effort being used in the working memory. Cognitive load theory was developed out of the study of problem solving by John Sweller in the late 1980s. [1] [2]

**Augmented reality** (AR) is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. As a result, the technology functions by enhancing one's current perception of reality. [3] [4]

Mariano Alcaniz, Manuel Contero, David C. Perez-Lopez and Mario Ortega (2010). Augmented Reality Technology for Education, New Achievements in Technology Education and Development, [5] state

In this sense, **augmented reality** appears as an emerging technology that promises to make "educational immersion" available to practically everyone. Augmented Reality (AR) is a technology that permits to overlay computer graphics onto the real world. Unlike immersive Virtual Reality, AR interfaces allow users to see the real world at the same time as virtual imagery attached to real locations and objects. In an AR interface, the user views the world through a handheld or head mounted display (HMD) that is either see-through or overlays graphics on video of the surrounding environment. AR interfaces enhance the real world experience, unlike other computer interfaces that draw users away from the real world and onto the screen.

## Practical exercises / How did you use it for the adult literacy project?

### Workshop in Naples, Italy using AR Playing Cards to teach the Alphabet

Krzysztof Bahrynowski from JPE used Octagon's (<http://4d.octagon-studio.com/>) playing cards in the LLP Grundtvig Adult Literacy workshop in March 2015 in Naples. The smart phone was connected to the video screen and with a special App the smart phone read the content of playing cards, each of them or one letter of the alphabet. A 4D animated animal was shown on the video screen for each letter and the learners repeated the name of the animals together in the training.

In this exercise the cognitive load that affects the learners can be considered as quite low as they joyfully learn together with the trainer which runs the AR applications with his smart phone.

## Workshop in London by Joanna Pinewood Education: Introduction of Numeracy and Literacy opportunities in Sketchup and Augmented Reality

Krzysztof Bahrynowski from JPE, London introduced Sketchup (<http://www.sketchup.com>) and Augmented Reality (AR) tools in the Erasmus+ KA1 staff training in London in December 2014. Sketchup is a computer programme used to create 3-dimensional objects. AR is a growing field of technology where real life is modified and enhanced by computer-generated sights and sounds.

The most common use of AR can be seen through mobile apps. Point your device's camera at something that the app recognizes, and it will generate a 3D animation or video superimposed over whatever is on your camera's screen. The effect makes the computer-generated item appear like it's really there.



During the workshops staff from Skills International GmbH and JPE created 3-dimensional molecules and used the AR to view their Sketchup molecule's models in Augmented Reality with AR-media. All the participants received Sketchup tutorial for beginners well before the meeting to prepare themselves.

Discussion on potential of learning: smart phones/ android apps / laptops, and usefulness of those tools for teaching basic literacy and numeracy. As Krzysztof

stated he uses those tools to improve motivation and self-confidence of the adult learners, who can create objects and pictures and learn meaning of icons used in computer applications.

Communication of digital information to adult learners is difficult most times and even in last few days JPE had to overcome new problems. Andragogists have to be not only facilitators but activators.

Krzysztof presented Google Drive (<https://www.google.com/drive/>) and tools like survey for effective communication. One barrier is that, to share any docs or survey, the recipients must have Google account as well.

The cognitive load for adult education staff and more generally for learners can become quite high when it comes to learn how to use the technology and Apps as a trainer or staff member of an adult education organisation. Therefore the training method should be adapted as a mixture of formal (guided) training and non-formal experimental approach.

## KA1 Training in London



## Chemical language in 3D

This purpose of developing clearer steps or instructions in ICT skills for 3D atomic and molecular modelling is to prevent the cognitive learning loading or stress of learners and trainers that cause “word blindness” that prevents acquisition of knowledge. It allows development of the international chemical language.

The brain thinks and dreams images and sounds (visual and audio senses). Persons unable to express themselves in writing often resort to kinaesthetic processes like illustration, painting and craft. Through kinaesthetic practice ICT skills are acquired. Instructions developed and facilitated such as the above example allow learners to acquire new employable ICT skills with less stress.

## Lessons we learned / Recommendations

Augmented Reality and 3D Visualisation tools are very complex and change extremely rapidly. Especially young staff needs transparent learning paths to create output successfully. Although young staff members are usually very experienced with computers and smart phones, it does not necessarily mean that they are used to use the development tools to create own content. If the Flipped Classroom method is applied – where learners get learning assignments prior to the training and use the joint time in class rather for practical implementation – junior staff needs clear instructions and support by experienced staff to create own educational content.



We realized that the educational staff can be best motivated if they either learn to use existing AR applications or if they are guided well to develop new solutions with tools. A good practice example is the project logo for the Erasmus + KA1 project ‘FANTASY TO REALITY – From Adult Literacy Skills to Augmented Reality’. First staff from JPE started to create the logo, and in the workshop in London the young staff from Skills International GmbH, Austria further adopted.

Andrea Fenz from Skills International GmbH visited the EDU|days 2015 (<http://www.edudays.at/>) at Donau-Universität Krems in Austria. She attended a workshop about Augmented Reality where also AR applications for the ‘schoolbook of the future’ were discussed. One of our findings was that we have to distinguish whether educational staff and facilitators aim to

- a) use existing educational resources for teaching purposes or
- b) develop own AR content for education and training.

The skills required by adult education staff and trainers are quite different if we consider both options. Trainers who use existing solutions must be able to find AR applications and use them in the classroom with the tablet, smart phone or computer. Adult education staff and trainers who want to develop own content must know about AR tools and how to use them successfully. The digitalisation of objects with photography and laser is also an actual hot topic together with 3D printers.

We also learned that knowledge about intellectual property rights is an issue which will need more attention in the future both for users and developers of new content.

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**CREATIVE TOOLKIT**

**Augmented Reality (AR)**