



## Virtual Reality Explorers

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### Abstract

*This paper will discuss an active project that is centered around the development and implementation of a teaching tool for the Primary Language Curriculum – English and Irish – in Ireland, through an enhanced learning environment utilising Virtual Reality and Augmented Reality (VR/AR) tools. Other subject areas such as History, Geography, Science and the Arts, will also be investigated over the course of the study. Through the use of a VR/AR tool the pupils benefit from rich opportunities in experiential learning which will be inclusive of all learning styles, needs and abilities. This project and the virtual reality experience it provides will engage and motivate all learners and provide them with the opportunity to engage with the wonders of our world without leaving the classroom. The project uses VR enabled low-cost digital devices for the creation of a virtual, highly engaging collective learning environment for each student in a class, that can be controlled by the teacher. The teacher leads the progress of the students through the environment and can control the pace and level of advancement through the environment to suit the learning requirements of the syllabus and student ability. The system is based around the Google Expeditions software, which is available for use by schools, free of charge. This software is run on low cost, tablet style devices, housed in a low-cost headset 'holder' with all units being tied together through a wifi gateway. All content within the system can be fully vetted and controlled by the teacher at all times from a 'master' tablet. The main advantages of using VR in the classroom are as follows, (1) Active rather than passive experience, (2) Immersive experience means no distractions, (3) Immediate engagement: useful in today's world of limited attention spans, (4) Exploration and hands on approach aids with learning and retention, (5) Helps with understanding complex subjects/theories/concepts and (6) Suited to all types of learning styles, e.g. visual.*

**Keywords:** *Virtual Reality, Immersive Education Technology;*

### 1. Introduction

Virtual field trips have become one of the most popular applications of VR technology for learning, and many schools have begun using Google Expeditions [1] to transport students to faraway and even inaccessible parts of the planet. The Google Expedition app is free to download on IOS or Android and teachers can invest in low-cost cardboard headsets that can be attached to a smartphone.

With these simple headsets, students can actively explore anything from the Pyramids in Egypt, the deep sea or to the Solar System. The Expeditions are collections of linked VR and AR content and supporting materials that can be used alongside the existing curriculum, see figure 1.



Figure 1: Google Expeditions RedboxVR 30 User Kit

Through the use of a VR/AR tool the pupils will benefit from rich opportunities in experiential learning which will be inclusive of all learning styles, needs and abilities. This project and the VR experience it provides will engage and motivate all learners and provide them with the opportunity to engage with the wonders of our world without leaving the classroom.

In Section 2 we will discuss the main learning objectives of the project. This is followed in section 3 by an overview of the observations and challenges. Section 4 will discuss a how we will evaluate the success of the project and lessons learned. The paper is concluded in section 5.

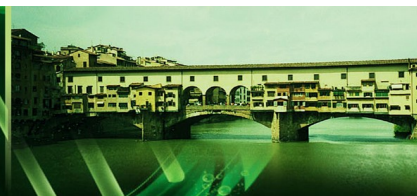
## 2. VR Project Learning Objectives

This project has four participating primary schools in Co Kerry, Ireland and has the following learning objectives (1) implement the Primary Language Curriculum – oral language, writing and reading. This project will impact positively on the children’s learning across all curricular areas as language is the foundation of all subject areas. This tool will be a vibrant stimulus to ignite their imaginations which will translate into the oral and written form. (2) Increased knowledge and skills development, increased motivation, development of positive attitudes. (3) Broadening the scope of resources available to the teacher, increases the engagement of teacher/pupil, greater sense of achievement for teacher, opportunities to further develop the relationship between teacher and pupil. (4) Development of assessment opportunities for and of learning, KWL, learning styles more easily identified using digital technologies such as VR/AR. (5) Provision of an innovative tool to engage pupils visually which will in turn lead to greater stimulation and engagement. (6) Collaborative approach to the project, i.e. cluster of schools/third level sharing of good practice between teachers and schools, sharing of expertise, opportunities for Continuous Professional Development (CPD). (7) Showcasing of positive impact of collaboration between schools. (8) Showcasing of work samples, video and pictorial records of project. (9) Developing a bank of age/class appropriate exemplars of good practice using VR/AR in a wide range of subjects. (10) Improvement in overall standardised results in English and Irish.

## 3. VR Project Observations and Challenges

The cluster purchased 2 sets of 30 student kits that will be shared amongst the four participating primary schools in the cluster. The kits include 30 student devices plus 30 VR viewer headsets, with a ‘master’ tablet to provide control of the system to the teacher or group leader and finally a suitably capable wifi router to allow ‘casting’ of the VR expedition from the tablet to the headsets.

A schedule for sharing of the kits is agreed by the cluster at the start of each school year. The use of this digital tool will allow more experiential based learning. There will be greater scope for the learner to lead his/her learning and opportunities for his/her voice to be heard.



The project will provide great scope for self and peer assessment.

- The impact of the project will be determined from standardised assessment results, interviews with pupils, feedback from all stakeholders including class teachers, SEN teachers, SNAs, principal and parents.

### 3.1 Project Communications Plan

Monthly meeting of the schools in the cluster in either one of the schools or IT Tralee. A blog will be set up which will be regularly updated by each participating school - it will include details of lessons using VR/AR, teachers' reflections on lessons – what worked well, what I would change the next time etc. Participating teachers will also be in contact via email throughout the duration of the project.

### 3.2 Initial Digital System Implementation

The following tasks will be undertaken by IMaR and Lero at IT Tralee in preparation for project kick-off in year 1:

- Evaluation of VR class systems available
- Pre-Procurements actions (quotations, negotiations, technical evaluation etc.)
- Assisting lead school in final procurement
- Initial system set-up, evaluation and trouble-shooting
- Initial trials in each school, ensure schools IT system is correctly configured for deployment
- 1 Day training course for primary school teaching staff in each school

### 3.3 VR Interactive Learning Pilot

Schools will focus on one Progression Continua in the English and Irish curriculum in each of the three years. Other subject areas such as History, Geography, Science, Arts will be fully integrated and lessons will be developed with the aim of reaching the Language milestones.

Year 1 – Oral Language  
Year 2 – Writing  
Year 3 – Reading

The six step School Self Evaluation Approach will be followed [2] and will focus in the areas identified above in September of each year, gather evidence from standardised test results, teacher observation, pupil questionnaires, parent questionnaires each year, analyse and make judgements as to how we will use the VR/AR tool to develop a set of activities/lessons for the following months to improve the learner experience and learner outcomes in the identified areas in October. An improvement plan and report will be written in October. This plan will be put into action from November to May each year and the impact will be evaluated in June of the three years.

An initial training session at the start of the project in Year 1 will be conducted by IT Tralee as part of the project kick off. IT Tralee, in collaboration with the cluster schools, will determine further training needs for the cluster schools in Year 1.

### 3.4 Project Outcomes and Deliverables

**Year 1** – increase in oral language competencies measured using the Drumcondra English profiles – oral language indicators [3].

- Exemplars in oral language development in all class levels using VR/AR.
- Increased motivation, engagement, attendance by pupils in those classes. CPD by all teachers involved.
- Opportunities for all teachers involved to reflect on and discuss Year 1 experiences, identifying any required modifications for Year 2.

**Year 2** – improvement in the writing competencies of pupils measured using the Drumcondra English profiles – writing indicators [3].

- Exemplars in writing development in all class levels using VR/AR.





- Increased motivation, engagement, attendance by pupils in those classes. CPD for all teachers involved.
- Opportunities for all teachers involved to reflect on and discuss Year 2 experiences, identifying any required modifications for Year 3.

**Year 3** – improvement in reading competencies measured using Micra-T [4] or Drumcondra Reading Test [3].

- Opportunities for all teachers involved to reflect on and discuss Year 3. A final project report and set of recommendations for other schools interested in using VR will be produced at the end of the project.
- A showcase showing the process of the project to take place in the Tralee Education Centre once each year – videos, blog posts etc.

#### **VR Content Creation**

As an additional feature to the program and to increase classroom and student engagement in the project and VR technology, each school will be given the opportunity to create their own VR 'expedition' content. Google account holders can use poly.google.com [5] to create their own multi-scene 360° panoramic experiences which can be shared amongst a classroom of students or even as part of an inter-schools collaboration.

#### **4. Evaluation and Lessons Learned**

The evaluation process is continuous. The project will be evaluated on a term basis, September to December, January to Easter and Easter to Summer Break. The following parameters will be used to evaluate the performance of the project and affects the introduction of digital technology to the classroom is having:

- Motivation levels of pupils
- Standard test results
- Attendance of pupils
- Parental feedback
- Pupil feedback
- Teacher feedback

The Government of Ireland Department of Education and Skills will be provided with a template for the implementation of a digital technology – VR/AR in a primary school based on thorough assessment, evaluation, data collection, setting of SMART targets to implement the Primary Language Curriculum at all class levels. This will be implemented through sharing of best practice. Details of all evaluations and results pertaining to the VR/AR digital technology in the classroom pilot will be made freely available for further evaluation and will be published in suitable education journals.

Action Plan for each year based on the School-Self Evaluation (SSE) Guidelines 6 step approach [2]. The SSE "empowers a school community to identify and affirm good practice, and to identify and take action on areas that merit improvement. School self-evaluation is primarily about schools taking ownership of their own development and improvement."

1. How well are we doing?
2. How do we know?
3. How can we find out more?
4. What are our strengths?
5. What are our areas for improvement?
6. How can we improve?

A final project report and set of recommendations for other schools interested in using VR will be produced at the end of the project and will be presented internationally as an extended journal article and conference presentation.



## 5. Conclusions

This paper has described an innovative project around primary school learning using VR technology and an investigation into the potential method for the introduction of immersive learning into the primary school classroom. This paper also presented an overview and observations of the project thus far and the benefits were outlined.

The evaluation of the use of such technology in the primary classroom, generating knowledge of its effects on curriculum delivery to the whole Irish education sector will benefit not just Irish education system but education worldwide.

## References

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