



# Journal of Virtual Studies

*Knowledge Emergence in Virtual Spaces*

Vol. 9 No. 2, 2018

## VRevolutions



## 2018 CONFERENCE PROCEEDINGS

ISSN: 2155-0107

# Virtual Outworlding

# EDITOR'S EDIFICE

The *Journal of Virtual Studies* publishes a special edition once a year for the Virtual Worlds Best Practices in Education conference proceedings. All papers were peer reviewed with the same level of care as journal papers typically are, convening an additional special editorial staff to assist in the process.

Since 2007, the educational communities using digital spaces for learning have come together to share what we have learned about using games and simulations in the classroom. For many, the Virtual Worlds Best Practices in Education has been the vanguard leading the charge on understanding how culture, technology and pedagogy merge to provide a more enriching experience for both teachers and students.

Over the last 12 years we have gone beyond the stage, establishing connections at the crossroads of being here and being epic. We have looked behind us at the legacy we have left behind and the horizons of new possibilities.

As we begin to close the 2018 chapter on the Virtual Worlds Best Practices in Education, we consider the VRevolution of where digital spaces are taking education, training, collaboration, and leadership. This year's VWBPE presenters and participants demonstrated once more in the three days that followed the opening, that there is still much that can be done, that will be done, and that will continue to be done.

As part of this journal, our peer reviewed papers showed a diversity of enterprise for education across different communities: advocacy, K-12, and higher education. We encourage you to explore them all and to consider how these papers and presentations may help to re envision your own approaches to

- analytic thinking and complex problem solving;
- creativity and innovation in design, practice, and learning;
- essential accessibility in digital and virtual spaces;
- collaboration and distance connections;
- multimedia communication and multifaceted interactions;
- ethics, responsibility, and tolerance; and
- so many other topics too numerous to mention.

In just over 82 pages, this special edition of JoVS puts the challenge forth to all our future authors: what vision can you imagine for the future of education?

The *Journal of Virtual Studies* is constantly evolving, just like the work of those who can imagine that horizon. We challenge you to share it with us by submitting to the journal.

Leticia De Leon  
Kevin Feenan  
JoVS Managing Editors

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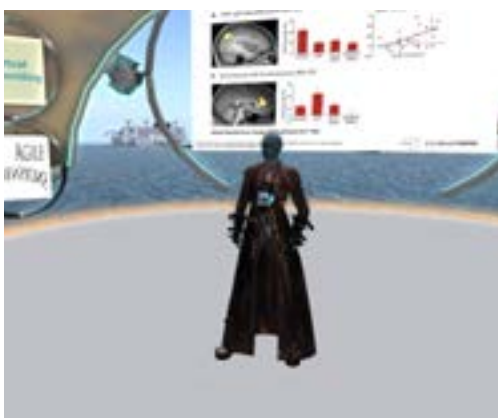
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## About the Journal

The Journal of Virtual Studies is peer reviewed and open access. It is sponsored by the Rockcliffe University Consortium, and its main aim is to feature work that examine knowledge emergence in virtual spaces, whether they be web 2.0 or 3D applications. We encourage teachers, academics, practitioners, and others engaged in the use of any virtual space for education, research, or training, to submit proposals to the journal.

## Focus and Scope

The mission of the Journal of Virtual Studies is to publish theoretical and practical concepts for the application of knowledge within virtual spaces. All methods, including, but not limited to, qualitative, quantitative, field testing, laboratory, meta-analytics, grounded theory, and combinations thereof are welcome. JoVS is interdisciplinary and international in scope. Preference is given to submissions that test, extend, or build either theoretical or practical frameworks dealing with knowledge emergence and virtual sciences outside traditional practice.

## Sections

- Perspectives
- Applied Research
- Practical Application
- Cultural Narratives
- In Review

## Subscription

JoVS is free and open access. In order to receive publication notices, please register at the website: <http://ejournal.urockcliffe.com/index.php/jovs/index>.

## Author Guidelines

JoVS accepts submissions year round, with publication occurring at the next publication edition for those who get accepted after a blind peer review process.

The submission process is fully online, so that authors must first register in the website.

Papers should be written in APA style, following all formatting as indicated by this style manual. Currently, there are no page limitations to submissions, as long as they fit one of our sections, are well-written, and have full APA style and citation usage.

Submissions should include an abstract (150-200 words) and a separate title page with author(s) information and affiliation.

## Copyright

Authors retain copyright and grant the journal right of first publication with the work simultaneously licensed under a Creative Commons Attribution License that allows others to share the work with an acknowledgment of the work's authorship and initial publication in this journal.

ISSN: 2155-0107

# RECHARGE YOUR PROFESSION AT THE FUTURE PRESENT

*The conference for educators, instructional designers, trainers, and technologists who believe that an imperative of future education is teaching digital literacies in the present.*

Attending conferences is part of our enrichment as professionals. At the Future Present, we call it recharging your profession because we are turning conferencing into an interactive, play-filled, dynamic, experiential learning.

The program is beginning to form, and it is fast becoming an event you don't want to miss. The first two reasons are our [keynotes](#):

Dr. Pamela Redmond and Dr. Chris Haskell, who epitomize innovation and engagement.



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# THE VIRTUAL WORLDS BEST PRACTICES IN EDUCATION CONFERENCE

## About VWBPE 2018

Virtual Worlds Best Practices in Education is a global grassroots community event focusing on education in immersive virtual environments. VWBPE goals are to provide educational and networking opportunities that are relevant to educational curriculum development utilizing virtual environments and “best practices”.

These include the following:

- helping to build community through extension of learning best practices to practical application of those ideas and techniques;
- providing networking opportunities for educators and the communities that help support education; and
- providing access to current innovations, trends, ideas, case studies, and other best practices for educators and the communities that help support education.



This open conference is organized by educators, for educators, to provide an opportunity to showcase the learning that takes place in this community of practice. The conference has been held in trust for the Educational Community by Rockcliffe University Consortium, who bears responsibility for the financial, copyright, and infrastructure concerns of the conference. Since 2007, VWBPE has attracted thousands of educators and communities of practice from all over the world with its theme-driven programs.

On March 15, 2018, Virtual Worlds Best Practices in Education convened its eleventh annual conference: VRevolutions. This year we asked our community

- What scares you, but intrigues you about the new tech trends that are coming, and how can they be

used for our purposes?

- What exciting potential do you see in Augmented Reality or Virtual Reality?
- How do we bring them into the classroom, the boardroom, the office, the studio – to push the boundaries of what we do thus far?

The community did not disappoint. This year, VWBPE had over 1100 attendees participating in 58 unique events and 20 exhibits that covered a broad array of topics, networking opportunities, immersive experiences, workshops, and game-based learning activities. The conference was supported by six sponsors that enabled VWBPE to continue to run a free and open access conference including support for our web infrastructure

and archives year-round. You will currently find over 24 hours of recordings on the [VWBPE youtube channel](#) and clips from other youtube uploaders who have graciously recorded segments for public viewing.

As we look forward to our twelfth year,

we will remain faithful to our goals and will seek out new opportunities to remain relevant in a constantly-changing technological landscape. VWBPE 2019 will spotlight the idea of *re:Vision* and how the changing technological landscape is creating opportunities for education that are rapidly becoming more broad, more networked, and more interactive than they have been at anytime in the past. All educators are encouraged to present, attend and take part in this discussion of collaborative deeper learning and co-presence in virtual worlds and games. Recharge your Profession at the Future Present



# THE THINKERER AWARD

The THINKERER AWARD is presented to an individual whose deeds and actions have shown a consistent selfless service towards the promotion of learning, community, educational practices, and who exemplifies the spirit of cooperative development within immersive environments.

Recipients of this lifetime achievement award are not simply outstanding professionals in their field. They characterize transformational leadership qualities which

- envision and guide change;
- enhance the motivation, morale, and performance of others;
- promote best practices and continuous improvement; and
- inspire through their words and actions.



Dr. Valerie Hill - Valibrarian in virtual worlds - is the director of the Community Virtual Library in Second Life and Kitley. Dr. Hill served as a school librarian for twenty years and has taught literature and information science at all grade levels from kindergarten through college. As a National Writing Trainer, Dr. Hill specializes in connecting literature to writing. Her research focus centers on the intersection of information literacy and libraries with virtual worlds and digital culture.

Valibrarian believes digital citizenship is essential to learning in today's metamodern post-Gutenberg era. Virtual worlds provide persistent spaces to help learners navigate learning landscapes in all forms: physical, virtual or augmented. A passion for literacy and learning has led Val to champion virtual worlds

through connecting educators, learners and learning communities in virtual worlds.

Val was presented with the Librarian of the Year for Lewisville ISD in 2010 and Texas Computer Education Association Librarian of the Year Finalist in 2007. After serving as a school librarian and professor of library and information science,

Valibrarian, along with her Community Virtual Library colleagues in Second Life, Kitley and web-based Cybalounge, strive to share best practices of education in virtual worlds. Through sharing both the highest quality immersive simulations and educational virtual communities of interest, learning opportunities not found in physical classrooms or online platforms can be



accessed for critical thinking and collaborative learning.

It is for all these reasons, and more, that the VWBPE Organizational Committee proudly confirms Valerie Hill, our Valibrarian, as the VWBPE 2018 Thinkerer Award recipient.

# INVITED SPECIAL PROGRAM

# KEYNOTES

## Identity, literacy, immersion and presence; joining together the building blocks of virtual world learning

*Mark Childs*



What are the digital literacies that virtual worlds require and can everyone acquire them? What are some of the barriers which virtual worlds present to learners? How can avatars redefine learner identities and promote learning? This keynote collects together my 12 years of research into how we define, describe and communicate the nature of virtual worlds, and looks forward to how VR may add to, or detract from, the virtual world experience. For educators new to virtual worlds, this aims to cover many of the basic principles of education in virtual worlds. For those more experienced, it will be an opportunity to reflect on many of those experiences.

**Keywords:** virtual worlds, digital literacy

Session Recording:

[Identity, Literacy, Immersion, Presence](#)

## The VRevolution calls for a new digital literacy

*Bryan Alexander*



A series of technologies are constellating to offer a new vision of computing. Virtual and augmented reality blend with mobile devices into mixed reality. Automation combines with gaming to produce deeper and greater simulations, human-computer interaction, and digital environments. Education now faces a growing range of possibilities for content presentation, student engagement, storytelling, and access. At the same time the VRevolution collides with broader challenges, including multiple inequalities and the threat of massive social disruptions. We suggest the exploration and adoption of a new form of digital literacy.

**Keywords:** digital literacy, mixed reality

Session Recording:

[New Digital Literacy](#)



# ABOVE THE BOOK INTERVIEW

The Virtual Worlds Best Practices in Education 2018 conference continued a new tradition on the program, with an interview feature segment, Above the Book.

*Discantus supra librum*, Above the Book, defines the musical art of polyphonic improvisation when in two subtle, but distinctly rhythmical, melodies combine to produce something greater than its whole. This is the concept behind this exploration of education and technology.

## Conversation with Ebbe Altberg

*Ebbe Altberg*  
*SL: Ebbe Linden*  
*Linden Lab CEO*

Join us for an engaging conversation with Linden Lab CEO Ebbe Altberg, who once again opens up about topics that are most important to educators and communities of practice within Second Life. Topics will vary and conversation will flow organically.

**Keywords:** Second Life, communities, educators

Session Recording: [Ebbe Altberg Conversation](#)



# PEER REVIEWED PAPERS

# Improving Digital Literacy - A Solvable Challenge using Virtual Worlds

A. Marie Vans<sup>[1]</sup>, Valerie Hill<sup>[2]</sup>, & Alyse Dunavant-Jones<sup>[3]</sup>

<sup>[1]</sup> HP Inc, HP Labs, Fort Collins, CO; <sup>[2]</sup> Peninsula College, Port Angeles, WA; <sup>[3]</sup> Community Virtual Library

## Abstract

The NMC Horizon Report: 2017 Library Edition <sup>[1]</sup> calls out the improvement of digital literacy as one of the major challenges faced by academic institutions in 2018 and beyond. “Digital literacy transcends gaining isolated technical skills to generate a deeper understanding of the digital environment, enabling intuitive adaptation to new contexts, co-creation of content with others, and an awareness of both the freedom and risks that digital interactions entail.”

<sup>[1]</sup> Virtual World librarians are positioned to lead efforts to develop digital citizenship by developing programs that assist in the mastery of responsible and appropriate technology use, including online identity, communication etiquette, and rights and responsibilities by learners. In this paper, we will present the definition of digital literacy and the very solvable challenges faced by educators and students. We will also include a list of possible solutions such as the “ACRL Framework for Information Literacy for Higher Education” <sup>[2]</sup>, “The JRC Digital Competence Framework for Citizens” <sup>[3]</sup>, as well as an approach used by the Community Virtual Library as an example for using Virtual Worlds for addressing digital literacy challenges. Finally, we call for the creation of a digital literacy lifecycle model led by the digitally literate and education-oriented digital citizens of virtual worlds.

Recorded Session:

## INTRODUCTION

Defining Digital Literacy is difficult because there is no agreed upon standard definition. Definitions span the gamut from just being able to use certain applications such as web browsers and digital office programs, to including everything that can be done online and on a computer, along with the emotional intelligence that accompanies the use of digital information. Regardless of how we define it, understanding that it should include the ability to think critically about and reflect on information, take into consideration social and cultural contexts, and encompass identity is generally recognized.

A few studies have already been run that point to the need to address these aspects of digital literacy. Only a small percentage of all adults are comfortable enough using technical tools to seek out learning opportunities online. <sup>[4]</sup> About 17% of U.S. adults are confident with their digital skills and ability to find information online they can trust. A much larger group of U.S. adults, 52% find it difficult to assess whether online information is trustworthy and are not confident in their technical skills using computers, smartphones, and other

“gadgets”. <sup>[4]</sup> Judging the trustworthiness of information by our young people is even bleaker. For example, one study showed that less than 20% of the high school participants questioned the strength of the evidence and source of an image shown to them from the internet. <sup>[5]</sup>

Obviously, such a small percentage of digitally literate people begs the question, how can we help increase the awareness of these issues? First, understanding what it means to be digitally literate for any population is crucial. While young and older adults may recognize the need to be digitally literate, younger kids may not yet recognize this need. Second, awareness of the solutions that already exist and the gaps that need to be covered is important for not reinventing the wheel. Finally, reusing implementations of solutions or spreading awareness may help in taking the number from 17% to a much higher percentage of digitally literate people. While acknowledging that the number of digitally literate people outside the U.S. is not currently known by the authors, we argue that the smaller percentage of the 17% in the U.S. that use virtual worlds can help to increase the overall literacy of the general population. Learning about the problem in virtual worlds can help in contexts outside of virtual worlds and initiating dialog about



these issues within virtual world communities can lead to better solutions in general.

In this paper, we give some background and attempt to define digital literacy. We also show the current efforts at solving these issues, including an effort by the Community Virtual Library (a real library staffed by professional librarians in a virtual world) to educate the community through an immersive Digital Citizenship Museum, currently being built in the virtual world Kitley. Finally, we end with a discussion that includes future directions.

## BACKGROUND

The New Media Consortium (NMC) was founded by a group of hardware manufacturers, software developers, and publishers who “realized that the ultimate success of their multimedia-capable products depended upon their widespread acceptance by the higher education community in a way that had never been achieved before.” [6] NMC is considered a leader in the inventive application of technology to overcome challenges in teaching, learning, and creative expression. The Horizon Report research effort produces well-known reports every year covering important developments, technologies, challenges and trends in Higher Ed, K-12, museums, and libraries.

Interestingly, the 2017 Horizon Report, Library Edition, identified the Improvement of Digital Literacy as a solvable challenge and Online Identity as an important development in Technology for Academic and Research Libraries with an adoption timeline of 2-3 years. Both of these have implications for learning and teaching in virtual worlds. Among other things, virtual worlds can be considered social networking platforms and as such, can create many occasions for dissemination of misinformation, invasion of privacy, and infringement of copyright. [7] Since libraries and librarians have always played a

major role in the development of traditional and digital literacy policies and practices, it only makes sense that libraries and librarians with a presence in virtual worlds be involved in implementing best practices for digital literacy. These practices include online identity (including privacy and authentication), communication etiquette, and rights & responsibilities (including fair-use and copyright).

In addition, the 2016 NMC Horizon Report on Higher Education [8] also calls out Improving Digital Literacy as a significant, yet solvable challenge. Here it is recognized that traditional literacy programs need to add the understanding of digital tools and information, even though there is still considerable lack of consensus on what it means to be digitally literate. Some educators believe that digital literacy is simply competency with a lot of different digital tools for different educational purposes while others believe it is an indicator of the ability to critically evaluate web resources. Both are vague and hard to act upon, although this lack of agreement on the definition of digital literacy has reached critical mass and spurred the drive for a universal definition.

It is important to understand that the lack of a definition or universal agreement on the skills and knowledge of a digitally literate person can cause confusion about what competencies are needed or expected for 21<sup>st</sup> Century success. For example, there is a gap between what employers expect and the skills demonstrated by

Traditional Literacy	Digital Literacy
Finding information	Vetting information
Reading (emersion)	Skimming (searching for solutions)
Note-taking	Curating
• transcribing	• linking
Prose composition	Multimodal composition
	• information design
	• data visualization
	• dynamic storytelling (video)
	• coding/programming
Static artifacts	Dynamic assets (multiple, diverse, reusable)
Learns from teachers	Teaches self
Permanence	Change

Figure 1: Traditional Literacy vs. Digital Literacy, taken from [9].

students looking for employment. While students may believe that a traditional college transcript are helpful for gaining employment, employers are far more likely to be impressed with a digital portfolio as a way to assess a student's skills. Figure 1 is an example of the gap between traditional literacy and digital literacy components.

## WHAT IS DIGITAL LITERACY?

The American Library Association defines digital literacy as “the ability to use information and communication technologies to find, understand, evaluate, create, and communicate digital information, an ability that requires both cognitive and technical skills.”<sup>[10]</sup> UK-based Jisc defines it to be “those capabilities, which fit an individual for living, learning and working in a digital society.”<sup>[11]</sup> Obviously, digital literacy is not an inventory of special technical skills, but is instead the growth of critical thinking and reflection in various social and cultural contexts.<sup>[12]</sup>

To muddy the waters further, in 2001, Bawden<sup>[13]</sup> identified six terms used in the literature related to digital literacy:

- information literacy;
- computer literacy: synonyms – IT/ information technology/ electronic/electronic information literacy;
- library literacy;
- media literacy;
- network literacy: synonyms – internet literacy, hyper-literacy;
- digital literacy: synonym – digital information literacy.

The important idea is not that there are a lot of different ways to describe a single literacy, but that there may be different literacies based on different populations such

as primary, secondary and higher education and that each are approached differently.<sup>[14]</sup>

An example of digital literacy for a targeted population is the DQ project for 8-12 year olds. Digital literacy is seen as a subset of a larger set of eight competencies that include Digital Identity, Digital Rights, Digital Communication, Digital Emotional Intelligence, Digital Security, Digital Safety, and Digital Use. Collectively known as “Digital Intelligence (DQ)” this is the “sum of technical, mental and social competencies essential to digital life,”<sup>[15]</sup> and contains the “knowledge, skills, attitudes and values required to thrive as responsible members of the online world, and to be confident in handling the challenges and demands of the digital era”. Figure 2 shows the DQ Color Wheel expressing these



competencies.

Figure 2: DQ Color Wheel, taken from [15]

Similar to the major categories in the DQ Color wheel, Ribble and Bailey describe the Nine Elements <sup>[16]</sup> of Digital Citizenship. These include Digital Access (helping to make sure everyone has access to full electronic participation in society), Digital Commerce (being effective consumers in the digital economy), Digital Communication (understanding the different digital communication options), Digital Literacy (information literacy skills), Digital Etiquette (standards of conduct or procedure), Digital Law (responsibility for actions and deeds), Digital Rights & Responsibilities (privacy, free speech, etc.), Digital Health & Wellness (physical and psychological well-being), and Digital Security (precautions to guarantee safety).

Digital Fluency is another term that takes digital literacy a step further by requiring competencies and capabilities that go beyond the skill level. <sup>[17]</sup> Digital fluency is a combination of:

- **digital, or technical, proficiency:** able to understand, select and use the technologies and technological systems;

vs finding the best tool to set up the document and collaborate effectively using it.

The very recent Digital Literacy Impact Study <sup>[18]</sup> describes three digital literacies (see figure 3) and are focused not only on skill development, but on gaining relevant learning experiences that can be translated to workforce readiness for college graduates. “Universal Literacy” is concerned with the ability to use basic tools such as office productivity tools and content authoring software. “Creative Literacy” takes these skills further by requiring the ability to create rich content using different multi-media software along with a good understanding of what it means to be a good digital citizen and copyright knowledge. “Literacy Across Disciplines” refers to the specific knowledge such as ethics and social networking within domain-specific contexts like sociology or psychology. The idea here is **that** mastery of these three literacies prepares students for future success in the world of work, where it is estimated that 65% of the jobs GenZ (those born in 1993 and after) will hold do not currently exist. Table 1 shows the skills employers expected of their workers in 2015 and what

	2020	2015
1	Complex Problem Solving	Complex Problem Solving
2	Critical Thinking	Critical Thinking
3	Creativity	Creativity
4	Judgement and Decision Making	Judgement and Decision Making
5	Service Orientation	Service Orientation
6	People Management	People Management
7	Coordinating with Others	Coordinating with Others
8	Negotiation	Negotiation
9	Emotional Intelligence	Active Listening
10	Cognitive Flexibility	Quality Control

- **digital literacy:** cognitive or intellectual competencies, which include being able to read, create, evaluate and make judgements and apply technical skills while doing so;
- **social competence, or dispositional knowledge:** the ability to relate to others and communicate with them effectively.

The difference between being digitally literate and digitally fluent, for example, would be following instructions to set up a shared document (literate)

they will expect in 2020.

Table 1: Current and future skill set expected by employers, taken from [18].

Interestingly, it appears that much of the digital literacy training that occurs in Higher Ed is geared toward the use and evaluation of information but not in the actual creation of information using digital tools. The same study confirms that other aspects of digital literacy such as laws, rights and responsibilities, and security of using



media and technology are either not taught at all or minimally taught.

These five definitions, taken from a wide variety of sources illustrate the current situation with regard to digital literacy. The problems that result from not being digitally literate reach across populations in all age groups and while definitions may differ in level of detail or abstractness, what is clear is that it has been recognized as a significant problem that needs to be addressed. This is evident in a number of proposed solutions put forth by the Association of College and Research Libraries, The International Society for Technology in Education, Jisc, and many others. The next section describes many

proposed frameworks and solutions to the challenge of digital literacy. While this list is by no means comprehensive, it represents some of the most important and diverse solutions to date.

### ACRL

The Association of College and Research Libraries (ACRL) released its “Framework for Information Literacy for Higher Education” in 2015. [2] This framework is not based on a set of standards, learning outcomes, or set of skills that must be mastered. Instead, the framework “draws significantly upon the concept of metaliteracy” and is composed of six frames that each

contain a main concept in information literacy, a set of knowledge practices, and a set of dispositions which are the habits of mind for learners who are developing their information literate abilities. These six frames include: [2]

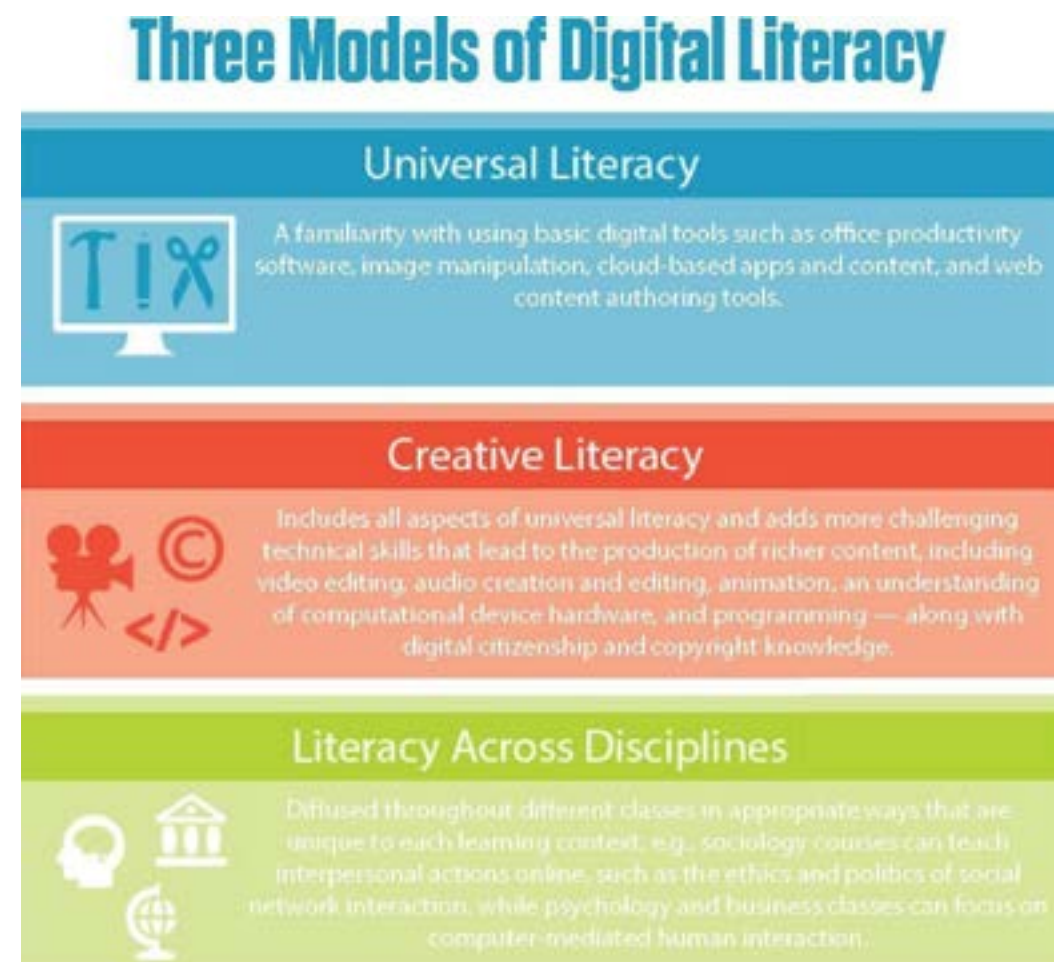
#### 1. *Authority is Constructed and Contextual*

Information resources reflect their creators’ expertise and credibility, and are evaluated based on the information need and the context in which the information will be used. Authority is constructed in that various communities may recognize different types of authority. It is contextual in that the information need may help to determine the level of authority required.

#### 2. *Information Creation as a*

#### *Process*

Information in any format is produced intentionally to convey a message and is shared via a selected delivery method. The iterative processes of researching, creating, revising, and disseminating information vary, and the resulting product reflects these differences.



of these solutions.

Figure 3: The Three Models of Digital Literacy, taken from [18].

### SOLVING THE CHALLENGES

Several organizations with a stake in this area have

### 3. *Information has Value*

Information possesses several dimensions of value, including as a commodity, as a means of education, as a means to influence, and as a means of negotiating and understanding the world. Legal and socioeconomic interests influence information production and dissemination.

### 4. *Research as Inquiry*

Research is iterative and depends upon asking increasingly complex or new questions whose answers in turn develop additional questions or lines of inquiry in any field.

### 5. *Scholarship as Conversation*

Communities of scholars, researchers, or professionals engage in sustained discourse with new insights and discoveries occurring over time as a result of varied perspectives and interpretations.

### 6. *Searching as Strategic Exploration*

Searching for information is often nonlinear and iterative, requiring the evaluation of a broad range of information sources and the mental flexibility to pursue alternate avenues as new understanding is developed.

The ACRL Framework is intended for librarians and other educators to use when developing their own information literacy programs (including digital literacy). Institutions can use the framework as a tool for making sure that these six important concepts are translated into actionable steps that result in digitally literate citizens.

### ***DigComp 2.0***

Making sure citizens are digitally literate is a world-wide challenge. For example, the European Commission recognizes that Europe is facing skills challenges that include digital competence.<sup>[3]</sup> The European Digital Competence Framework for Citizens or DigComp, was developed by the Joint Research Centre (JRC) of the European Commission with input from several stakeholders from European industry, education, employment, and social partners. The resulting framework was published in 2013 and helps improve digital competence for citizens, helps policy-makers

with creating policies that support digital competence, and provides common terminology for describing and identifying key areas of digital competence.

DigComp contains five main competence areas including:

#### 1. *Information and data literacy*

Browsing, searching, filtering data, information and digital content; Evaluating data, information and digital content; Managing data, information and digital content

#### 2. *Communication and Collaboration*

Interacting through digital technologies; Sharing through digital technologies; Engaging in citizenship through digital technologies; Netiquette; Managing digital identity

#### 3. *Digital Content Creation*

Developing digital content; Integrating and re-elaborating digital content; Copyright and licenses; Programming

#### 4. *Safety*

Protecting devices; Protecting personal data and privacy; Protecting health and well-being; Protecting the environment

#### 5. *Problem Solving*

Solving technical problems; Identifying needs and technological responses; Creatively using digital technologies; Identifying digital competence gaps

This framework for digital competence is used generally by groups that formulate policy, do instructional planning, as well as for assessment and certification. The JRC continues to improve the framework as well as monitor its use and effectiveness.

### ***Digital Literacy Impact Study***

The NMC Horizon 2017 Digital Literacy Impact Study<sup>[18]</sup> includes several recommendations for preparing learners to be successful in the workplace of the future. These include assessing the digital literacy gap with industry partners, redesigning learning and development systems, and cultivating lifelong learning.

Assessing the digital literacy gap refers to the difference

between what educational institutions teach and what industry needs in terms of skills. Educational institutions will need to work with industry partners in order to identify those gaps if they are to contribute to the workplace success of graduates. Assessment needs to be on-going to remain relevant. Redesigning learning and development systems to include digital literacy integration is the second recommendation. While it is beyond the scope of this article to list the different possibilities, one thing to point out is that data will need to be collected by both the learning institution and industry partners in order to justify changes to the learning and development systems. Finally, cultivating a lifelong learning is one of the most important aspects of digital literacy because specific technology skills will quickly become obsolete and students and employees need to be able to learn new technologies if they want to remain engaged and up-to-date. A side effect benefit for educational institutions is that by creating an environment where lifelong learning is commonplace, these institutions become important for learning even after a student has graduated.

### *Jisc's Developing Digital Literacies Guidelines*

The Joint Information Systems Committee (Jisc) has created a guide called, "Developing Digital Literacies"

originally published in 2014. Jisc is an organization that provides "Digital solutions for UK (United Kingdom) education and research".<sup>[19]</sup> Figure 4 shows the seven elements of digital literacies as defined by Jisc, a Figure 4 framework that is very similar to the DigComp and ACRL frameworks.

The main components for developing digital literacies include <sup>[19]</sup>:

1. Strategic perspectives on digital literacies
  - a. Developing a strategic vision underpinned by institutional values and effective leadership
  - b. Translating the vision into different strategies, policies and processes and taking a joined up approach
  - c. Providing support services and opportunities which enable students and staff to develop their digital capabilities
  - d. Enabling a supportive IT infrastructure which supports diverse digital practices and flexibility
  - e. Promoting a culture of innovation and change where staff and students at all



Figure 4: Jisc 7 elements of digital literacies, taken from [19].



levels are involved in strategic conversations around digital literacies and a range of engagement models are supported

- f. Reviewing current policies, processes and practices to better understand existing support for digital literacy and help prioritise areas for development

## 2. Developing digital literacies in practice

- a. Implementing different support models such as students as digital pioneers/change agents
- b. Developing digital literacy frameworks with staff and students to encourage engagement and ownership and using these as tools for dialogue and evaluating skills and competence
- c. Assessing student and staff skills through surveys and engagement activities to ensure these are understood and appropriate support developed
- d. Developing digital literacies for employability and exploring recognition and reward schemes
- e. Developing different levels of support from short online guidance and briefings to more hands-on workshop activities
- f. Embedding digital literacies in continu-

ing professional development (CPD) and staff development programmes

- g. Focusing on digital identity and reputation as a powerful motivator to engage with digital issues

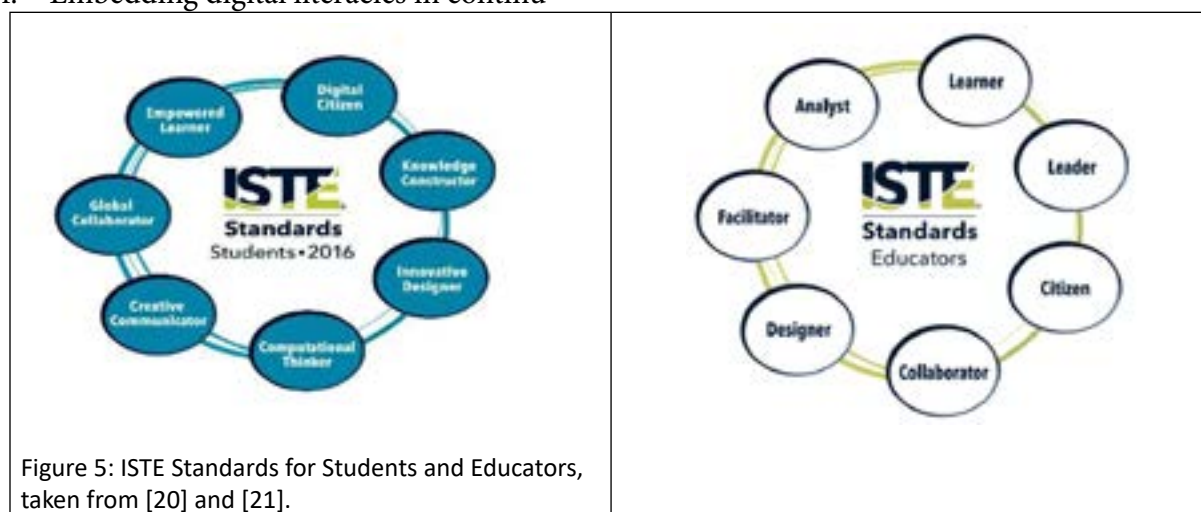
In addition, the Jisc guidelines include example projects to illustrate how these components can be implemented along with several pages of tips for course teams, IT services, senior managers, students, and support services.

### *ISTE Standards*

The International Society for Technology in Education (ISTE) is an organization of educators that help other educators solve tough problems in education using technology. They have developed a set of standards for students <sup>[20]</sup> and another set for educators <sup>[21]</sup>, both of which address the issue of digital citizenship. Figure 5 contains graphics of both standards, taken from [20] and [21].

Each circle has a definition and set of actions associated with each standard represented by circles in Figure 5. While the standard of Citizen for educators addresses the need to establish the environment for students to acquire digital literacy skills, the Digital Citizen standard for students require a demonstration of their understanding and acquisition of digital literacy knowledge and skills.

### *CVL Digital Citizenship Museum*



The Community Virtual Library (CVL), with a presence in Second Life <sup>[22]</sup> as well as Kitley <sup>[23]</sup>, created a temporary exhibit in 2017 that ran from late February through December 2017 that focused on Digital Citizenship. A diverse group of presenters, from librarians and educators, to artists and non-profit representatives, pulled together their expertise in digital citizenship to create an immersive educational experience with the goal of bringing awareness of digital citizenship to the virtual world community as a whole. Topics included works on Digital Health Literacy, Digital Citizenship for Kids, Digital Citizenship for Avatars, Digital Citizenship through the eyes of an Artist, Authentic Avatars, and many, many more. <sup>[24][25]</sup> As a result of continued favourable responses, the CVL board of directors decided to open a permanent museum on Kitley.

The mission of the CVL Digital Citizenship Museum on Kitley is to be a leader in the pursuit to make sure every person is digitally literate through education, raising awareness, and building community around the challenges and solutions of digital literacy. This space will encompass the diverse definitions and best practices presented above as well as new information and research as it becomes available. While virtual worlds are small in comparison to the rest of the digital world, by creating a networked community of digital citizens who are willing to engage with us, the Digital Citizenship Museum on Kitley could have a significant impact on this challenge. We are hoping to attract digital literacy experts for developing content in the museum and immersive experiences as well as enthusiastic learners who can help spread the word.

This museum is part of a series of islands called “CookieII”, which also houses the Kitley branch of CVL. The museum will hold the exhibits that were present on CVL in Second Life with enough space left to add new exhibits. These exhibits will expand to include the challenges and solutions we have presented in this paper. It is currently being built and will also have comfortable space for invited presentations and community networking. The expansion of CVL to Kitley and other virtual worlds includes a Virtual World Database project to help people locate immersive learning environments and communities across various virtual worlds <sup>[24]</sup>. Virtual worlds provide a sense of presence for users

(teachers, learners, artists or explorers) in persistent simulated learning environments. This sense of “being together” helps focus attention in a digital culture that is distracted by constant incoming information and notifications from various apps. Understanding the need to balance physical life with virtual and augmented spaces is part of digital literacy. Advantages of virtual worlds include the ability to connect globally and to build learning communities which promote critical thinking and live interaction, which is often lacking in online platforms such as Blackboard or Canvas. For over a decade, librarians have been utilizing Second Life to provide library services including teaching navigation skills in digital spaces as technology tools evolve <sup>[26]</sup>.

## CONCLUSION & FURTHER WORK

Improving digital literacy is gaining visibility as an important, but solvable challenge for libraries, colleges, universities, and other educational institutions including K-12. We have shown that defining digital literacy can depend on the level of detail for competencies and the population involved. However, we believe it boils down to not being a checklist of skills, but rather involves critical thinking and reflection, identity, and social/cultural contexts. “Focusing on theoretical aspects of digital literacies by developing definitions, frameworks and models of digital literacy can be beneficial as a way of engaging staff. These can provide a reference point going forward or a visualisation of a shared understanding of what digital literacy means but the key benefit is that they provide a focus or tool for engagement and discussion. <sup>[19]</sup> We have included several frameworks and models that can be used as tools that may be useful in creating such a digital literacy lifecycle, beginning with awareness, moving to the development of programs, and finally to the measurement of outcomes. Because the definition is flexible, the next step is to create a digital literacy lifecycle model to guide institutions in selecting or creating digital literacy frameworks and programs that best fit the needs of their communities.

While we also encourage educators outside of virtual worlds to consider this issue, virtual worlds are a perfect platform from which to start the conversation and tackle this challenge. Young children are already utilizing virtual worlds like Minecraft which can embed learning and digital literacy. An example is a digital citizenship

game created by fifth grade students to help younger students understand privacy and security online <sup>[27]</sup>. More research is needed to understand the best practices of utilizing virtual worlds for teaching young people. We believe that the majority of the educators, librarians, and non-profit users in virtual worlds are part of the 17% of digitally literate people and part of the solution. In fact, Rockcliffe University Consortium <sup>[28]</sup>, which has libraries on several different virtual worlds including Second Life, Kitley, and Avacon, has already identified digital literacy as an important challenge and features several in-world displays that highlight the issue and they provide resources for those who would like to learn more. In addition to acting as a kind of interactive framework in itself, the Community Virtual Library's <sup>[29]</sup> upcoming Digital Citizenship Museum is another example of virtual world citizens coming together to teach and spread awareness of digital literacy. With so many great minds and digital experts within virtual worlds, there are bound to be citizens capable of solving the digital literacy crisis both in their communities and in the broader digital sphere. Will you join the fight?

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# Mobile virtual reality for environmental education

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## *Abstract*

We report students' experiences of using a mobile virtual reality application to learn about the environmental impact of large scale developments on nature reserves, by comparing the physical field trip location to a location in virtual reality, which they accessed while in the field on a geography field trip. We present our research with 64 secondary school students who used Google Expeditions, a smartphone-based virtual reality application, on a geography field trip to their local nature reserve in south-east England. Google Expeditions (GEs) consists of over 700 expeditions or guided field trips that students experience on a smartphone through a virtual reality viewer. An expedition comprises of 360-degree photospheres of locations like the Queen Elizabeth Olympic Park in London, the Grand Canyon, Antarctica and Iceland. Through the use of virtual reality in the field and the affordances of the GE app, students became aware of the issues created by large-scale development on the environment, acquired knowledge about its implication for the ecosystem, and suggested actions for protection of the environment. Following the field trip, students sent letters to the Chiltern Society (a voluntary organization dedicated to conserving of Chilterns' landscape in the UK) that discussed the implications of large scale development plans close to their local nature reserve in the Chilterns.

## Introduction

Fieldwork has a long tradition in geography and in certain sciences, notably geology, biology and environmental sciences (Stokes & Boyle, 2009; Stokes, Magnier & Weaver, 2011). Fieldwork involves leaving the classroom and engaging in learning and teaching through first-hand experience of phenomena in outdoor settings (Association for Science Education, 2011; Tilling, 2016). Exploration in natural habitats introduces students to the complexity and messiness of the real world (Lambert and Reiss, 2015), stimulates their curiosity, and increases their interest in scientific inquiry (Foskett, 2000; Remmen & Frøyland, 2014).

Teaching and learning in a field setting enhances environmental literacy, instills social responsibility towards preservation of biodiversity, and raises awareness of ethical questions about other living beings (Scott, Goulder, Wheeler, Scott, Tobin, & Marsham, 2015). Fieldwork is valuable for educators too - in enhancing their confidence and expertise through shared experiences in the field; and interaction with students is vital in forming the relationships that are important in the classroom (Cooley, Burns, & Cumming, 2015).

Technology-enabled virtual field trips (Stoddard, 2009) through photographs, videos, live expert seminars, web-based interactive experiments, and three-dimensional (3D) simulations (Argles, Minocha, & Burden, 2015; Park, Shin, Cui, & Hwang, 2008) have been promoted as a means for improving the effectiveness of the physical fieldwork experience (Robinson, 2009). However, even though virtual field trips (VFTs) are perceived as being complementary to physical field trips, the literature on the role of VFTs in fieldwork education is surprisingly sparse (Maskall & Stokes, 2008; Stoddard, 2009).

### *Virtual reality*

Virtual reality (VR) generates realistic images, sounds and other sensations to replicate a real environment, or to create a non-realistic setting. The characteristics of VR are 3D images, virtual objects that behave like their real-life counterparts, and features that enable interactivity with the virtual environment. VR has been used as an educational and training platform for simulating object behaviors (e.g. in manufacturing (Nee & Ong, 2013) or

for visualizing difficult concepts (Foskett, 2000) (e.g. a solar system).

Virtual reality is being delivered in various ways – ranging from smartphone-driven VR using VR headsets such as Google Cardboard and Samsung Gear VR, to desktop-driven VR with head-mounted displays such as in HTC Vive, Oculus Rift and Sony PlayStation VR. Further, 3D virtual environments can be accessed on desktops and mobile devices that may not require a VR headset as in the case of 3D virtual world Second Life (or in Sansar, a social VR platform), or in 3D virtual environments developed in game development platforms such as Unity 3D. For example, the UK's Open University's 3D virtual geology field trip, a simulation of the Skiddaw mountains in UK's Lake District, was developed in Unity 3D (Argles et al., 2015).

Virtual reality can be a single-user experience as in smart-phone driven VR, or users may experience other users (as avatars or otherwise) in 3D virtual environments and in mixed reality environments.

Various smartphone-based VR applications (apps) have emerged that allow users to access and navigate 360-degree photospheres and 360-degree videos of real or simulated places for educational purposes. For example, there are 360-photospheres of places such as Galapagos Islands or Great Wall of China, or WaterAid's VR documentary 'Aftershock', which has 360-degree videos to highlight Nepal's challenges to restore water access after devastating earthquakes in 2015. Further, VR can provide experiences of unrealistic events, such as bringing dinosaurs to life in [360-degree videos](#), a collaboration between Google Arts and Culture and The Natural History Museum.

### *The Google Expedition application*

Google Expeditions (GEs) are guided field trips to places that students experience on a smartphone through a VR viewer called Google Cardboard. The GE app (available for Android and iOS platforms) has more than 700 expeditions. An expedition comprises of 360-degree photospheres of a location (e.g. Rio de Janeiro). GEs enable visualization of locations which may not be feasible or easy to visit in real life (e.g. Great Barrier Reef or Tolbachik volcano). Further, GEs have simulations to envision concepts and systems such as

the human heart, the respiratory system (Figure 1), or the process of pollination.



Figure 1: GE "Human Anatomy – Respiratory System", scene "Inside the lungs"

Using a tablet and via the GEs app, the educator guides the students to look at the scenes of an expedition. The students use the app in the "follower" mode and experience the GE/VR through the smart-phone embedded within a VR viewer. Figure 2 (a) shows a tablet and a Google Cardboard VR viewer with the phone slotted in; in (b) the tablet is in "guide" (or educator) mode and the phone is in "follower" (or student) mode. On the tablet, the educator selects a point of interest (the circle).



Figure 2: (a) Tablet and Google Cardboard viewer with the phone slotted in; (b) The tablet is in "guide" (educator) mode and the phone is in "follower" (or student) mode.

In the research study being reported in this paper, we discuss the role of VFTs, as in GEs, in imparting environmental education. Through an analysis of students' experiences, we show how VFTs, as in Google Expeditions, connect the learning from an international context to a local context in geography fieldwork.

### Fieldwork case study

The Chilterns, located north west of London in the UK, cover 650 square miles, and almost half of the Chilterns is an officially designated Area of Outstanding Natural Beauty, parts of which will be adversely affected due to High-Speed railway construction (referred to as [HS2](#)) throughout the Chilterns. Local residents' groups, along with the support of the Chiltern Society, have worked together to establish [HS2 Watch](#), an independent group monitoring the progress of the railway's construction throughout the Chilterns.

We describe the experiences of students using the expedition "Environmental Change in Borneo" on a set of smartphones and virtual reality headsets provided by the research team during a field trip to Prestwood nature reserve in the Chilterns area of the UK. At the end of the field trip, once students returned to school, they were required to reflect on their experience of using virtual reality in the field through a question: "How did virtual reality help you to understand about the impact of large-scale developments on the Chilterns?". We discuss their reflections by using the Awareness and Action continuum (Barnes & College, 2013) as a framework. Through an analysis of students' post-field narratives, we show how mobile VR as in GEs bridges virtual fieldwork with physical field trips, improves the value of fieldwork education and facilitates experiential learning.

### Theoretical background for Environmental Education

Fieldwork is an example of experiential learning, or "learning by doing" following Kolb's learning model (Kolb, 1984). Fieldwork has three phases (Maskall & Stokes, 2008): pre-field trip preparation; fieldwork; and post-field trip debriefing. The preparatory phase involving pre-trip induction, and development of inquiry (questions for investigation) and data collection procedures is analogous to Kolb's abstract conceptualization; the fieldwork or doing phase is analogous to Kolb's active experimentation and concrete experience phases; and the reflective post-trip phase is synonymous with Kolb's reflective observation (Scott et al., 2012). Here we focus on the experimentation and concrete experience phase occurring in the field.

During the past 50 years, teaching strategies in fieldwork (Caton, 2006) have evolved from an educator-led field excursion to an active student-driven inquiry-based fieldwork, a process driven by questioning, investigating, analyzing information and developing new meanings and understandings (Jansen, 2011). The key ingredients of an inquiry-based learning approach are that learning is stimulated by a question or problem, and students learn through active engagement in the process of seeking knowledge and new understanding to fulfil the inquiry (Ord & Leather, 2011).

Environmental education represents an integral part of school education (Manzanal, Barreiro, & Jiménez, 1999). Through fieldwork, students can learn about the environment, while being outdoors, where the environment is “used as a vehicle for the development of knowledge” and where their experience of fieldwork and the knowledge acquired is proved to influence beliefs about ecosystems (Manzanal et al., 1999). Among the goals of environmental education are attitude and behavioral change reflected through actions (Gayford, 1996). In our study, the educator aimed to sensitize students to potential environmental changes in their local nature reserve triggered by the construction of a HS2 railway. The action required was to write letters to the Chiltern Society, explaining the impact of such large-scale development on the nature reserve.

We refer to the Awareness to Action (AA) continuum (Barnes & College, 2013) as a framework for environmental education and for our analysis. The Awareness to Action represents a learning process with several stages:

- Awareness and appreciation, which allows students to experience nature and its beauty;
- Knowledge and understanding through which students understand how natural systems work and how they are interconnected with human systems and activity;
- Attitudes and values through which students learn about respect and concern towards the planet and feel ethically motivated to participate to environmental preservation
- Problem solving skills that students acquire to identify, analyze and contribute to resolving

environmental issues, and

- Personal responsibility and action, through which moral responsibility turns into ecologically sensitive behaviors.

### **Affordances of Google Expeditions**

To explain how VR technology facilitated fieldwork education, we present the affordances of the Google Expeditions app. As a part of our wider research program, which is the first extensive user-centered research program on the pedagogical effectiveness of GEs in science and geography education, we have derived the educational affordances of the virtual reality application (Minocha, Tudor & Tilling, 2017) and their role in fieldwork education, inquiry-based learning and learning via simulations.

The term affordance refers to the perceived and actual properties of an object that determine how the object could possibly be used; a chair affords (“is for”) support and, therefore, affords sitting. The design of an object has to be “perceived” to be of use to the potential user – hence, the emphasis on “perceived affordance” by Norman (1988). We have followed Gibson’s (Soegaard, 2017) and Norman’s (1988) interpretation of educational affordance as it is the participants’ (educators and students) perceptions of the affordances of GEs, and how these affordances support their learning and teaching and influence their experiences with virtual reality.

For each of the affordances that we have derived (see Table 1), we discuss the perceptions and experiences of participants, and how the affordances influence learning and teaching.

### **Description of the Research Study**

In this research study, we describe how a virtual field trip in the GEs app was used during outdoor geography fieldwork to help students draw comparisons between the local area they were visiting and locations in the rain forest in Borneo. The simplicity of the equipment associated with the mobile or smartphone-driven VR of GEs (as compared with VR headsets tethered to high-spec machines) enabled us (the research team) to use VR in the field. We were able to power the router (for creating the wireless network between the tablet and



Affordance	Meaning of the affordance and implications for learning and teaching
360-degree visual authenticity	<p>The 360-degree photospheres of physical places in GEs capture every possible viewing direction, thereby, providing a wide field of view. The perceptions of participants towards this affordance and which support learning were: accurate physical representation of the space (Fowler, 2015); spatial relationships between the rain forest and the Chilterns area (Gersmehl &amp; Gersmehl, 2011), sense of spatial presence, and experienced immersion.</p>
360-degree navigation	<p>Students are able to move their head left to right, but also up and down to see the scene all around them within the Google Expedition (Figure 3). This enables them to orient themselves and to apprehend the characteristics of the place they are visiting. The perceptions of participants towards this affordance are: spatial understanding (Gersmehl &amp; Gersmehl, 2011) understanding the proportions of the elements in a scene and how they compare against one another, e.g. how large the rain forest was; being able to observe and understand the characteristics of a physical location; and spatial relationships.</p> <div data-bbox="599 779 1214 1125" data-label="Image"> </div> <p>Figure 3. Students viewing the expeditions via the VR viewers during the field trip</p>
3D view	<p>The lenses of the VR viewer focus and reshape the images in a GE for each eye and create a stereoscopic 3D image. The 3D view affordance is particularly relevant for visualizing and for understanding perspectives. The perceptions of participants were: sense of orientation in a place, sense of presence and sense of immersion within VR.</p>
Emphasis	<p>This affordance is specific to the educator or guide-driven mode of GEs on the tablet. The educator can highlight aspects of a scene in an expedition by selecting pre-defined viewpoints or by creating new ones through tapping on the tablet's screen. The students follow or look at the viewpoint while being guided by an arrow on the smartphone VR scene. In the field trip, students followed the points of interest selected by the educator (Figure 4).</p> <div data-bbox="318 1570 925 1881" data-label="Image"> </div> <div data-bbox="980 1570 1484 1892" data-label="Image"> </div> <p>Figure 4: (a) Circle marking the point of interest selected by the educator in "guide" mode; (b) arrow pointing students to the point of interest in "follower" mode. GE: Environmental Change in Borneo, scene "Pristine rain-forest"</p>



Synthesis	In a lesson, an educator can use scenes from more than one GE, or use GEs alongside other resources such as videos, or sounds. The perceptions related to this affordance were integratability (use more than one expedition at once) and combine-ability (combine GE with other resources). During the field trip reported in this paper, the educator used several scenes within the same expedition and showed different perspectives on the rain forest.
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Table 1: Affordances and their implications for learning and teaching

phones) with a battery. The equipment was set up on a picnic table in the nature reserve.

### Fieldwork setup

Sixty-Four Year 7 students explored the GE of ‘Environmental Change in Borneo’ during their field trip to a local nature reserve in the Chilterns area of South East England. The aim of this virtual field trip was to help students understand the impact on nature produced by deforestation, land clearance and development of buildings, and to sensitize them to the potential magnitude of impact on their local nature reserve that may be caused by the development of HS2 railway nearby.

The students looked at the following scenes from the “Environmental Change in Borneo” Expedition:

- “Pristine Rainforest” – describing the plant and animal diversity in Borneo (Figure 4);
- “Land Clearance and Deforestation” – showing how the forest is cleared and how former forest areas turn into open space (Figure 5);



Figure 5: GE “Environmental Change in Borneo”, scene “Land Clearance”

- “Land Encroachment” – showing how land is being cut through to create space for new real

estate development (Figure 6);



Figure 6: GE “Environmental Change in Borneo”, scene “Land Encroachment”

- “Sandakan Development” – showing modern touristic coastal developments at the beach (Figure 7).

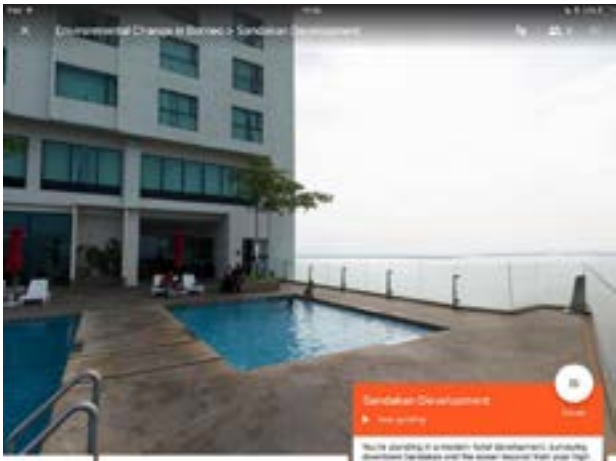


Figure 7: GE “Environmental Change in Borneo”, scene “Sandakan Development”

During the field trip to their local nature reserve, students came in a group of 8-10 students at one time to the GEs table (set up on a picnic table) and spent about 10 minutes touring the “Environmental Change in

Borneo” Expedition under the guidance of the educator (Figure 8).



Figure 8: Students exploring GE “Environmental Change in Borneo”

### *Fieldwork data collection*

During the field trip and after the tour of the GE, the students were asked to reflect on how the virtual field trip made them feel differently about the large-scale development planned near the local nature reserve. After the field trip and during the debriefing session of 30 minutes, they wrote their reflections in response to this guiding question: “How did virtual reality help you to understand about the impact of large-scale developments on the Chilterns?” After this debriefing session, we (research team) conducted a face-to-face group interview with two educators who had led the physical field trip.

The ethical considerations and the research design of this research study was approved by The Open University’s Human Research Ethics Committee.

### *Data analysis*

The audio-recordings of the educator-interviews were transcribed verbatim. These transcripts were analysed inductively and deductively in NVivo 11 software for iOS through thematic and axial coding (Corbin & Strauss, 2008). For the analysis of student written reflections, we asked the educator who organised and conducted the field trip to look at the scripts and comment on the how they relate to the learning outcome of the lesson.

During this initial analysis, the educator noticed that students had become aware of the effects of large scale developments and deforestation; that they had gained knowledge and understanding of the implications and even thought of possible actions that they could take to prevent similar situations in the Chilterns or anywhere else. Based on the educators’ comments and her understanding of what students intended to learn, we developed inductively a list of categories to analyse students’ reflections. We then assigned these comments to our category list, in a second iteration of the analysis.

Upon consulting literature sources, we realised that the categories that we had developed were very much similar to the ones proposed by Barnes and College (2013) in the Awareness to Action continuum, and outlined in Section 2 of this paper. Following this, we consulted the AA continuum and our category list, checked for duplicates and realised that some of our initially developed categories could be subsumed to the broader ones in the AA continuum. For instance, for the “Awareness and appreciation” category in the AA, we added two subcategories of “awareness of issue” and “awareness of location and its characteristics”. Once we created a new integrated category list, we performed a third iteration of analysis and coded all reflections again by using the new enhanced model. Due to the nature of the fieldwork and the learning outcomes planned by the geography educator, we were able to map our findings to four out of five stages of the continuum. There wasn’t a scope for analyzing the change in acquisition of students’ problem-solving skills (one of the stages of this continuum) within this research study involving a single physical field trip. We present our findings in the next section.

### **Study Results**

Students were able to connect their understanding and relate the changes in Borneo rain forests to their local nature reserve and to map the broader context of infrastructural development and its impact on nature: “It is very helpful to see what we are trying to understand, because it’s quite hard to comprehend what would happen to the Chilterns if HS2 were to happen and seeing the jungle [in Borneo] and what happened to it was unbelievable and should never have happened.”

### *Awareness and appreciation*

In our data analysis, we identified two types of awareness fostered by the experience of VR in the field. The first type of awareness refers to the environmental challenges created by large-scale development in Borneo and the local nature reserve, respectively. By exploring the scenes in Google Expeditions (Figures 4-7), students could visualize how the rain forests in Borneo had been affected by deforestation, palm oil plantations and real estate developments: *"It really helped me learn about the devastation of the world now and in the future"*.

The second type of awareness refers to learning about the characteristics of the places in virtual reality and of the one that they were visiting as a part of their field trip: *"it helped me [to understand] because I saw a beautiful jungle full of green and life. Then in virtual form we saw a building site, sparse trees. If that happened to the Chilterns, with e.g. HS2, it would be devastating."*

The affordances that contributed to students' awareness were:

- 360-degree visual authenticity and synthesis – seeing a faraway place and accessing various perspectives through several scenes within the same expedition: *"It helped us understand as it showed us lovely beautiful forest that was untouched by humans. Then, it showed us a picture of a barren, ugly place where trees had been chopped down. This made us think that we are cutting down too many trees [for] housing more than we should"*.
- emphasis – although students were free to explore the photospheres alone, they were guided to look at relevant points and focus on specific content: *"it helped me because you could actually see what you were learning, not just talking about it. I found it fun and a new way of learning. It was helpful that they gave you an arrow to show what you are looking for."*

### *Knowledge and understanding*

Through their comments, students demonstrated that they acquired knowledge and understanding of the issues that come along with large scale developments and their impact. One student commented: *"it helped me understand because it gave me an idea of how big*

*the impact was and the large scale of the setting. It also helped me because some things in the settings were not seen in everyday life e.g. higher [rain forest] trees"*. Further, students showed a good understanding of the geographical concept of scale. This was supported by the affordances of 360-visual authenticity, 360-degree navigation and 3D view, which gave them the bird's eye view over the rain forest: *"it showed me all different things and how things like HS2 can really impact. You could see it on a large-scale so you got to see things [on] an overall scale."*

The educator commented that students were able to compare and contrast their local nature reserve to Borneo rain forests in VR: *"it is that taking the local into global [...] or the global into local."* The possibility to actually visualize impact of development on nature is an experience that would be difficult to acquire without a comparison of places. Using virtual reality while in the field gave students an unique experience that educators found very useful for their actual understanding of the issue: *"one stage would be "yes, we've done the fieldwork, we've been to see 'this is the area that would be destroyed perhaps, if something big like that was to happen through it' and then secondly, when you look at that 'yeah, that could be pretty horrible' but then to see that [Borneo] and see actually it really would be pretty horrible, it all makes it make sense again"*.

Students inferred the broader impact on ecosystems and predicted the change brought by human intervention through their comments on the effects of flora and fauna that lives in their local nature reserve and how the construction of the railway would affect biodiversity, tourism and living standards of locals: *"It made me understand that there would be a big change in the Chilterns and not necessarily a good change. Also, it will ruin it for the wildlife and animals which help the Chilterns grow and expand. I hope the Chilterns won't change."*

### *Attitudes and values, personal responsibility and action*

The attitude of students towards the environmental changes depicted in the GE was expressed in negative statements. Students described the environmental impact as being worse than they had expected and devastating for the health of the rain forest: *"It made*

*it easier to actually get a view on what tragedies might happen in the near future. I always thought that people were being dramatic, but now I understand the long-term impact it will have on the world/woods."*

The affordances of GEs such as 360-degree visual authenticity, 360-degree navigation and 3D allowed students to see more of the rain forest as well as understand the degree of impact: *"When you look through it you can see much more than you could in a normal picture also as you can see 360 degrees around it make it a lot clearer and see the big impact on the environment closer up"* and *"it helped me understand because it was a 360 degree view and you can see the impact that we have on the environment around us."*

The personal responsibility and action component of the Awareness to Action continuum were reflected in other comments. Several students acknowledged that there is a shared responsibility for protecting nature and there is a need for action to prevent the destruction of nature reserves: *"We all have to share our part of helping in the world"; "we need to try and stop destroying the wildlife and do something about it"*.

The planned outcome of the field trip and of the virtual reality experience via the VFT was to support students in writing a letter to the Chiltern Society to address their concerns about the development of the HS2 in the Chilterns area where the Prestwood nature reserve is located. Following the fieldwork, students composed the letter and the most relevant ones were passed on to the Chiltern Society. The best written and most comprehensive letter was awarded a prize.

## Discussion

In this paper, we have shown how using VR in a field trip to the local nature reserve supports environmental education by following the Awareness to Action continuum: from students becoming aware about the changes brought by large scale development projects to taking action in the form of a letter to the Chiltern Society.

Students were able to connect their understanding and relate the changes in Borneo rain forests to their local nature reserve and to map the broader context of urban

development and its impact on nature: *"It is very helpful to see what we are trying to understand, because it's quite hard to comprehend what would happen to the Chilterns if HS2 were to happen and seeing the jungle [in Borneo] and what happened to it was unbelievable and should never have happened."*

The affordances of GEs such as 360-degree visual authenticity, 360-degree navigation, 3D view, and synthesis enabled students to familiarize themselves with the 360-degree space within the GE and see beyond what a flat view in a video or a book or a photo may provide. This perception of space contributed to their spatial understanding and sense of scale of the context that they are visualizing in an expedition – and, in this case, the scale of the environmental change caused by man-made interventions. Students explained this experience of scale and understanding the extent of change via the GE: *"It was useful. It made you understand how habitats can change from human technology and wants. It gave you a before and after picture and it was scary how it can change"*.

With the support of GE, students were able to cover the stages of the Awareness to Action continuum of environmental education during a field trip. Furthermore, our findings complement those of Manzanal et al. (1999) that direct experience acquired in the field helps students to understand habitats and environmental issues. A review of environmental education literature by Stern, Powell & Hill (2014) concluded that field trips support environmental education through "active and experiential engagement with real-world environmental problems". Our interactions with students and the educators who organized the field trip in this research study have shown the role of virtual reality and VFTs as a means of extending and enhancing the field trip experience beyond the physical field trip. Students visited their local nature reserve and, through virtual reality, accessed remote areas, and engaged with VFTs to support their learning in the field.

Students became aware of nature's beauty both in Prestwood and in Borneo as well as understood the threats these areas are facing. They acquired knowledge about the ecological issues that large scale-development pose in both locations; they manifested negative



attitudes; and called for action to preserve ecosystems in Borneo rain forests as well as in the Chilterns area.

The geography educator who led the fieldwork commented that the major benefit of using VR in the field was to achieve contextualized comparisons between places and to inspire students to think of potential action that they would take to protect the environment: “*I think they saw the whole Borneo “visit” in a kind of context of what we were looking at there [in the field], which is I think was the purpose [of this activity].*” Through this, students were able to acquire environmental literacy as well as learn spatial skills, such as the scale of impact and spatio-temporal changes.

### Challenges and future work

Some of the challenges of using VR in the field are posed by accessing the technology safely in various weather conditions, keeping the smartphones and tablet charged for the duration of the field trip, as well as being able to set up a good connectivity between smartphones and the tablets with the help of a battery-powered router.

The focus in this research study was on geography; however, other subjects with tradition in fieldwork, such as ecology, biology and environmental sciences could also benefit from including virtual reality within fieldwork education. VFTs as in GEs are a useful way to experience places that they may not be able to experience in real life such as the flora and fauna on Galapagos Islands, or the volcanic landscapes in Indonesia; or which may be dangerous to visit such as areas of high tides or near an active volcano. Furthermore, VR can be used across all the stages of fieldwork: from supporting educators and students to prepare ahead of a field trip; during a field trip to compare and contrast physical locations with VFTs embedded with mobile VR; and revisiting locations in VR for de-briefing after a physical field trip.

The adoption of technologies in schools and in further and higher education is still in its infancy and its development will progress and mature as the evidence-base on the pedagogical effectiveness of these technologies grows. Any technology-enabled learning initiative including the VR-based GEs that we have focused on, can be effective only if the educator

justifies its usage to students and embeds it within the curriculum.

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# A Hybrid Virtual World Conference as a Way to Create Community

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## **Abstract**

This paper provides an example of how to host an academic virtual world conference and presents findings regarding the advantages and challenges of a virtual world conference. Examples of different virtual conferences are also discussed. The goal of an online virtual conference is to reach out to an increased number of people and to create community. We suggest a hybrid approach to hosting a virtual conference and discuss the future possibilities of virtual conferences.

## **Introduction**

Technology has changed the way many people communicate and conduct meetings. From popular video chat programs such as Skype and Google Hangout, to online video conference tools such as Adobe Connect, WebEx, and GoToMeeting, video-based meetings and, on a broader scale, conferences - larger organized series of meetings focused on a theme(s) or subject(s) - have become a de facto method.

While the convenience of these tools has made attending easier than ever before, only a few of these tools can provide a sense of immersion similar to attending a conference in the real world. In this essay, we argue that a collaborative professional community can be created through “technology integration and implementation, increasing the likelihood of reflective dialogue, sharing of instructional practices, and generally increasing collaboration on new practices” (Rogers, 2002, p. 65) and that online 3D virtual worlds have significant value in providing immersive and creative ways to host conferences (Han, 2011). We present an example of a virtual world conference hosting experience and discuss the advantages and challenges of a virtual world conference. Ultimately, we suggest a hybrid approach and discuss the future possibilities of virtual conferences.

## **Online 3D Immersive Virtual Environment**

As Vygotsky (1978) states, learning is a social process; learners learn while they are interacting with peers and subject experts. Participants in a virtual community can come together from around the world and have synchronous and asynchronous communication without the constraints of geographic boundaries. They are able to meet without the time and expense of long distance travel. Virtual communities include users interacting through email, listservs, discussion boards, instant messaging, websites, games, and virtual worlds. Second Life, for example, is an online 3D visualized virtual world in which participants can create their own imaginative worlds. Thousands of users interact in real-time via their customized avatars every day in Second Life, where their use of an avatar impacts the sense of immersion such that the users feel as if they are actually “there” (Blascovich & Bailenson, 2011).

3D virtual worlds, such as Second Life, provide an interactive environment. With its customizable avatars, modifiable online environment, and lack of storyline, Second Life enables users to feel more present and freer than other virtual communities. The communication methods include text chat and voice chat. Role playing,

treasure hunts, and social events are other features that allow participants to immerse themselves in various roles because the virtual world functions like one large stage (Han, Yaro, Gillard, Haugh, Ihnatovych, & Liu, 2014).

The visualized environment and customized avatars stimulate users' visual senses and help them reach the immersion stage, i.e. flow. According to Csikszentmihalyi (2008), a person typically experiences deep involvement, enjoyment, and creativity during flow. Flow is a psychological state of immersion. Compared with other web conferencing tools, 3D virtual worlds for conferences are able to provide for users the feeling of involvement, enjoyment, and creativity during the conference. It is for these reasons that Second Life has become a go-to place for discussions of online 3D immersive virtual environments and a great place for hosting virtual world conferences.

### **Virtual Conferences**

In this paper, we will introduce two successful massive virtual world conferences as examples of how other virtual world conferences work, and we will discuss the experiences we gained from them.

#### *Virtual World Best Practice in Education*

Online 3D virtual world conferences have existed for many years. Virtual World Best Practice in Education (VWBPE) is a classic example of an online 3D virtual world conference and uses one of the most successful online virtual environments, Second Life. Participants of this conference are mostly teachers, instructors, professors, and students who use the virtual world for education. The purpose of this conference is to share the ideas and methodologies of using the virtual world for education, as well as related theories and practice. The subjects that have been discussed in this conference include but are not limited to: art education, adult education, K-12 education, science education, distance education, and business education.

Similar to traditional real life conferences, VWBPE has "meeting rooms" that participants can join. The presenting spaces usually have a screen for slide presentations and seats for attendees. Although they are

simulations of real world conference rooms, their set up can be very creative, e.g., a conference room in the sky. This sense of attending a presentation in a "real" meeting room is what other video conference tools are missing.

The simulation of conference rooms or spaces in a 3D virtual world is one of the keys to achieving immersion; however, it is not the only way. Participants attend these meetings through the use of their avatars. This provides another layer of the immersive experience, as participants can see other participants "sitting" next to them and interacting with each other. Moreover, participants' avatars provide for them an embodied experience of attending the meeting.

In an almost weeklong conference, VWBPE provides lectures, round table discussions, workshops, machinima exhibitions, interactive posters sections, social events, and tours that are similar to what a real world conference can offer. Moreover, some of the lectures and round table discussions are recorded and can be retrieved by viewers.

#### *OpenSimulator Community Conferences*

Another example is the OpenSimulator Community Conference (OSCC). Similar to VWBPE, OSCC takes place in a virtual world. Although it uses a similar platform, the OSCC is located on an open simulator, one of the hypergrid, not Second Life. At OSCC, there are also meeting rooms for participants to choose which sections they would like to attend. The formats of presentations are similar to VWBPE and also include lectures, workshops, machinima exhibitions, interactive poster sections, and tours. Even though OSCC is only a one-day conference, the total duration of the conference is thirty days when pre-conference and post-conference activities are included.

Both VWBPE and OSCC are free of charge. Participants only need an avatar to participate in these conferences. Their meeting locations are mostly temporary, allowing public access only during the conference; however, the post-conference activities and interaction between participants establish a strong social network that extends from the virtual to the real world.

### **A Hybrid 3D Virtual Conference**

The idea of a virtual conference in the field of art education came out of the monthly International Art Education Association (InAEA) meeting in January 2014; there had not been a virtual conference in the field of art education at that point. We decided that a virtual conference focusing on digital technology and art education was a timely topic and would benefit art educators from around the world. In addition, we hoped to see more people join a 3D immersive virtual community that would provide them with new ways of communication. Therefore, we knew from the beginning that we had to host the conference using Second Life as the main venue. However, the biggest challenge for us was reaching out to art educators who has never used Second Life or did not have the technology to access it. As a result, the idea of a hybrid 3D virtual world conference emerged.

### **Tools and Technology**

As the hosting organization, InAEA had a suitable space in Second Life that we used for hosting our monthly meeting, so we decided to use the InAEA virtual gallery as the venue of the conference. There were only a few tools we needed to create for the conference: a podium, a slide show presentation machine, video boards, a sitting area, visual signage, and direct teleportations.

To overcome the limitation of access to Second Life for many people, we also decided to stream the conference from Second Life using Google Hangout on Air, a free live streaming service that allows people to watch a live video of a meeting using a web browser. The basic function of Google Hangout on Air includes screen sharing and Q&A, as well as recording of the event. Therefore, right after the conference was finished, the recorded video was ready on YouTube.

To set up Google Hangout on Air for streaming the Second Life event, we used three computers. One computer was used as the cameraman, which used an avatar in Second Life to capture and stream the screen and sound to Google Hangout on Air. The second computer stayed on Google Hangout on Air to observe the streaming situation. And the third

computer was the facilitator in Second Life, observing and moderating the Second Life activities as well as housekeeping the virtual world environment.

### *The Physical Venue*

Besides the virtual venue in SL and the Google Hangout on Air streaming, we also provided a physical venue at The University of British Columbia (UBC) that was free for educational purposes. The physical venue screened Google Hangout on Air presentations, which allowed physical venue participants to address questions to Second Life participants through Google Hangout on Air's Q&A function. Since most of the moderators were from UBC, there was also a room booked for moderators to prepare and assist each other with the technologies.

### *Preparation for the Virtual Conference*

Finding the best technologies for this conference was the biggest issue we encountered. There are many different web-conferencing tools available, and all provide different functionalities and require different prices. Since we sought to host a free online virtual conference, we tried to find the best free web-conferencing tools. We chose Google Hangout on Air because it was free and participants were not required to have a Google account to access it. It recorded and streamed the event for eight hours, and the participants could communicate with a moderator through the chat function to interact with presenters who were in Second Life.

The organization between InAEA and presenters was straightforward and easy to manage. Email was the basic communication tool. The virtual presentation materials, such as the slide screen, were ready to use one week prior to the conference. During the week of the conference, presenters were advised to log into Second Life to practice. We were at the virtual conference venue to assist presenters before the conference if they made an appointment with us.

### **Advantages and Challenges**

The advantages of the virtual world conference over real world conferences include minimal cost to the organization hosting the conference, specific or special experiences for the participants, and enabling people



from different geographic locations to attend without long flights or costly travel expenses. All technologies and locations we used were free, and participants did not pay a registration fee. As for labor and working hours in the virtual world, the conference time was set previously. The organizer only needed to upload and set up the slideshow, and create the audience seating and speakers' podium. Most of the moderators had Second Life experience, so they did not require training for this event. The organizer used email to connect the participants. Second Life presenters spent about an hour before the conference checking on the venue and making sure their slideshows worked correctly.

This conference hosted several different formats of presentation: pre-recorded video presentations, Second Life lecture presentations, round table presentations, and interactive posters, as well as machinima sections. Many of these formats in the virtual world conference provide irreplaceable experiences that cannot be achieved through other web conferencing tools. The most obvious examples are the round table presentations and interactive posters. During the round table presentation, the presenters' avatars were sitting close together, and, when they had a conversation, participants looked at each other's avatars as they spoke. While many web-conference tools are able to show videos of each presenter, the feeling of presence, if any, is not as strong as in a virtual world. Moreover, because of the possibilities of interactive posters in the virtual world, the posters presented can be much more creative and interactive than the posters in real life conferences.

While there are many advantages, there are also challenges. First of all, it takes time to learn new technologies, and people need to have learned the technologies to participate in virtual conferences. Many participants reported that they were not able to find the Q&A icon in Google Hangout on Air; therefore, they were unable to participate in the discussion through the web. Additionally, many people found Second Life to be complicated and difficult to learn. In addition, there were technical challenges: the voices of presenters in Second Life were difficult to hear at times, and some people were automatically logged out of Second Life because of the length of the conference. Other challenges included malfunctions of the shared media in Second Life, which

prevented video presentations or machinimas from syncing. There were also difficulties with archiving field trips, which limited the possibility of taking field trips during the conference.

### **Virtual World Conference Connects People**

The virtual world conference achieved our goal of connecting people from different parts of the world, an important part of our mission. The presenters came from the US, Canada, Australia, Taiwan, Ukraine, Singapore, and Iran. Some presenters used recorded videos; some presented in Second Life. There were about 25 to 30 people attending at the peak time in Second Life. The overall total Google Hangout on Air participation was 157. Not only did our participants come from different places, most of the committees organizing the conference were located in different states and countries as well.

Many participants wrote emails to us and stressed that they saw the possibilities of the virtual world and current technology. One participant wrote us saying that she was driving on interstates while listening to the conference through Google Hangout on Air. She said, thanks to technology, she did not miss anything and was inspired by many of the sections.

The best part of the conference was not the number of participants or the fancy technology we used; it was the conversations and discussions we shared. Although each participant was sitting in front of a computer, a feeling of community was achieved through the synchronized conversation in the virtual world. The immersive virtual environment helped provide a sense of presence for the conference participants. But, more importantly, a well-planned event, reaching out to people from different places, is the key to bridging participants and forming strongly connected communities.

When a technology is accepted by the general public, it becomes a good method for connecting people. However, when people are not comfortable with a new technology, it becomes a barrier, blocking people from information they could access. The purpose of an online virtual conference should be to reach out to people who would not be able to participate in a real world conference due to the need for travel and other

practical concerns. From this experience, we learned that a virtual world conference could reach out to more people, but only if careful consideration is given to helping people accept and be open to learning to use the required technologies.

## **Conclusion**

Technology is a means of communication rather than a source of understanding. What really connects people are conversations, activities, and discussions. 3D virtual worlds provide ways to enhance the experience of conversation by giving participants the immersive experience of attending a conference. As virtual reality (VR) technology has become more widely available, we can expect to attend conferences using VR technology in the near future. The experience of online meeting could be changed dramatically. What is more important is the building of a sense of community (online) through conferences. We believe that 3D virtual worlds, blended with technologies that are easier to access for most people, are among the many ways to achieve this goal. No matter what technology we use, we want to keep in mind that real communication happens when bridges are established.

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# Quadrivium Networking Topic: Digital Makerspaces

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## Introduction

Physical makerspaces have existed for some time, most notably for people pursuing entrepreneurial ventures that involved creating a product such as apparel, jewelry, ceramics, or other custom-made items. Manufacturing makerspaces exist in schools and libraries to allow students to use tools like Lego blocks, computers, and 3D printers to create, build and craft their ideas. Many of these makerspaces reside in libraries, both public and in-school. The New Media Consortium's Horizon Report: 2015 K-12 Library Edition lists Makerspaces as a "an important development in technology for academic and research libraries" (p. 36). This Quadrivium provided a platform for participants to share their experiences with digital makerspaces. The conversation resulted in a wealth of ideas and an insightful discussion about teams and collaboration.

## Overview of the Main Topics or Ideas Discussed

### *What is a Digital Makerspace?*

We began the discussion with the question...What is a Digital Makerspace? At first participants shared examples of their use of or knowledge of makerspaces (both digital and physical). Eventually, we began to posit definitions of makerspaces. Most seemed to agree that a Digital makerspace allows for individuals to work in teams...alone and collectively. We explored the concept of teams and teamwork, the formation of teams and the role of teamwork in the creation and implementation of makerspaces. An excellent definition of a makerspace can be found here: <https://www.makerspaces.com/what-is-a-makerspace/>.

Definitions offered and discussed by the Quadrivium

participants were:

- "...an educational tool for schools"
- "a makerspace is essentially an area that encourages creativity by allowing the user/learner to build."
- "Makerspaces are a wonderful way to learn how to work together and discover the skills and talents of each other."
- "...the notion of a makerspace was conceptualized to build teamwork and problem solving skills essential to our job market."
- If you think of Makerspace as one end of a continuum where Emergence is really the paradigm, then something like TopHat (<http://tophat.com>) allows for more emergence to happen. Less linear, less unidirectional."
- "...allows more opportunities for people to ask questions, get interested, or invite someone to join in what they're doing."
- A conversation between the artist and the audience
- "the intersection of the real with the virtual", as in creating a 3D object in the real world and bringing it into a virtual world.

### Examples of Using Digital Makerspaces

Those in attendance shared a variety of experiences with makerspaces, such as:

- Fifth graders building a digital citizenship library in Minecraft while working in the physical school library (<https://youtu.be/BQIBtD7fD1k>)
- Creating a virtual counterpart to a real world venue, such as the builds in Second Life that replicate cities



(London, Paris, Barcelona, New York, Philadelphia), landmarks (Eiffel Tower, London Bridge, etc.), college campuses, museums, and other famous edifices.

- Creating a virtual world version of a 2D simulation exercise done in the real world
- Recreating a country (in this case Sweden) using Minecraft (<http://www.lantmateriet.se/en/Maps-and-geographic-information/Maps/oppna-dاتا/>)
- Creating a town and going to the actual spot via Google Earth Virtual Reality
- A civic makerspace in which school children simulate their towns, including making laws, electing officials, creating and using a constitution, etc.
- Programming turtles in Minecraft to do what they wanted them to do
- Importing books (via goodreads or ISBN scan) into a virtual library and making notations on the covers that appear when clicked
- Laboratories that contain 3D printers, sewing machines, VR glasses, AI devices, and computers with tools such as ARIS (<https://fielddaylab.org/make/aris/>), Minecraft, World of Warcraft, virtual worlds (Unity, Second Life, Kitley), and webworld (<https://virtualoutworlding.blogspot.com/2018/03/2018-ww-cybalounge-import-collada-from.html>)
- Using augmented reality tools similar to Pokemon GO
- Using a 3D painting program such as Tiltbrush (<https://www.tiltbrush.com/>)
- Colorado University – Denver has an innovation lab that facilitates student collaboration during orientation for new students. Students in groups are given a piece of paper and tape and must collaborate to make a backpack that would hold a heavy book.
- Students working with archaeologists to uncover why “somewhere around 600 AD, everyone was killed in a fort and their bodies left there, buried with gold.” Students are using digital augmentation to help to explain why (<http://www.sandbyborg.se/en/home/>)

#### *Teams and the Collaborative Properties of Makerspaces*

The examples above generated much conversation about

how they are used to develop individuals and to teach students how to work in teams. The teamwork discussion built on the definition of a digital makerspace as being “a venue for individuals to work collectively”. There were many opinions about the benefits (and downsides) of working in teams. The point was made that the reason for digital makerspaces is that a creator can build on their own. However, others voiced the opinion that the makerspaces allowed one to work individually, yet also collectively, giving rise to increased individual creativity. As one person put it, “in a makerspace, 2+2 = more than 4”...or what cyberneticists call synergy. Basically, the concept of makerspace is crucial in that people start off as individuals, then become part of a team.

This discussion on teams, teamwork and collaboration resulted in a wealth of ideas about teams, their formation, the roles people take (or are given) in teams and how teams are organized. It was posited that if teams are “dynamic, organic, they form and de-form and re-form organically. The “virtual part of means that you can have larger teams” (such as the groups formed in virtual worlds which have members from all over the world). “Digital teams sometimes form naturally because of less physical world distractions.” However, it was also suggested that for some being in a team can be a distraction; that being with others can interfere with what needs to be done as an individual. As one person put it, it is “hard to know the difference between lonely and focus sometimes”.

Participants discussed how they select student teams in their classes...everything from allowing students to self-select to using randomized algorithms. The discussion on roles in teams was a very interesting one in that some felt that each person in a team select the role which fit his or her strengths best. One person pointed out that roles are helpful in cooperative learning settings. Others suggested that if roles are selected by the team members, the more outgoing in the group would select the “best” roles and those who are less outgoing may be left with the least desirable roles. Some questioned whether roles are necessary. It was also pointed out that one could look at roles in terms of making and in terms of the group dynamics. One tool used for this is a set of virtual de Bono “hats” that people wear to show the roles they are taking (<http://www.debonogroup.com/>)

[six thinking hats.php](#)).

One participant summed up the teamwork aspect of makerspaces thusly: “We’re pieces in a jigsaw puzzle and the puzzle is solved when everyone discovers the piece that fits them best and that gives them the opportunity to play to their strengths in that puzzle.”

### *Essential Components of Digital Makerspaces*

When the discussion moved to the essential components of a makerspace, the group generally agreed that the key aspects present are social, collaboration, individual and sharing. One educator pointed out that a makerspace is an excellent environment within which to use the Socratic teaching method. Others suggested that a key “reason to have makerspaces is to create synergies between the makers” ( $2+2 = \text{more than } 4$ ). It was also agreed that makerspaces in education means that students are “learning to accommodate different learning styles, different communication modes and NOT being impatient because one member of the group does things slower than most”. Thus, the role of an educator is to encourage and teach students to accept differences in all aspects of a team endeavor, including the ability to work individually.

Another interesting twist in the conversation was the idea that makerspaces give students the freedom to fail. Students can learn that failure can be a necessary condition of the creative journey. Having an idea, testing it, refining it and making it again are all elements of the power of failure that leads to a positive result. “Virtual makerspaces provide the opportunity to fail without anyone (or any property) getting hurt”.

### **Best Practices in the Use of Digital Makerspaces**

As is often the case when a group of educators gather, there was a great deal of sharing....of ideas, tools, resources and specific web sites. Examples of Digital Makerspaces in Education, Archaeology, Community Planning, and the intersection of Digital Makerspaces with virtual worlds dominated the conversation. There was a lively discussion and sharing of ideas. Most in attendance would agree that the examples shared are illustrative of best practices in the use of Digital

Makerspaces because they: 1) are spaces for all learner types and needs; 2) provide a space for learners to create, build/make, revise, and re-create (i.e., allows experimentation); 3) have a balance between teamwork and individual work; 4) can be done less expensively than a “real” makerspace; and 5) are not so much about the tools; but about the learning environment that accepts failure as part of the creative process. Makerspaces also make the abstract concrete.

### **Conclusions**

This Quadrivium discussion resulted in several surprising conclusions. On its face, a Digital Makerspace has a fairly straightforward definition, namely the digital (or virtual) version of a real life makerspace. However, as the discussion evolved, it became clear that it is difficult to define digital makerspaces since they can take many forms, have multiple purposes, and serve many constituencies. Participants gave examples of makerspaces using virtual worlds and games such as Minecraft. The purposes for makerspaces ranged from education to archaeology with elementary school students to adult learners.

Digital makerspaces enable educators to teach and learn not only about creating and building; but also about teamwork, teams, how to construct/form teams and the implications for students in team activities. The concept of working in a team can be a deterrent to creativity if the individual is one who works best alone. Yet, makerspaces can enable those tending toward introversion to work individually, but as a part of a collective. The discussion about teams and teamwork also brought out the significance of recognizing different learning styles among and between members of teams and in forming them.

The concept of Digital Makerspaces involves the intersection of the real with the virtual. For example, artists and builders in virtual worlds very often create their work in the real environment and bring these creations into a virtual world such as Second Life.

This group of educators also discussed the concept of failure and how learners do not always deal well with failure. Digital Makerspaces allow students to “fail”

successfully, so that they learn that failure is part of the creative process.

This Quadrivium only scratched the surface of a very interesting and timely topic of discussion. Thus, it can be an excellent topic for future in-world discussions.

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# Quadrivium Networking Topic: Future of STEAM

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## Introduction

Our conversation revolved around the future of STEAM (Science, Technology, Engineering, Arts, and Math). STEAM has had several variations presented over the few years especially with the insertion of the “A” in steam. The addition of the Arts in STEM gave a renewed focus from having a more clinical research/ hard science focus to an added creativity component. This additions helped shape our discussion to include creation based activities of digital building, creation based technologies, Virtual Reality, and even gaming. This Quadrivium provided a robust conversation about the vast experiences and conceptual frameworks that go into STEAM.

## Overview of Main Main Topics or Ideas

Our conversation involved roughly 5 focus points: What does STEAM mean ( Current definitions) How does STEAM relate to Virtual Reality, How does Coding fit into STEAM, Gender considerations with STEAM, and Future possibilities. Since STEAM can be such an expansive topic we tried to get some focused definitions of it to begin with to provide a springboard to discuss some specifics. The conversation flowed pretty easily into some very specific topics of VR and Coding. The topic of gender and STEAM was a more organic conversation based on some of the focal points that were generated from the conversation as a whole. This topic could certainly trend into controversial territory, yet we tried to keep it focused to how STEAM careers and higher ed programs can encourage more women to enter into these fields. Lastly, we really tried to wrap our collective thought leaders into where STEAM may be heading.

## Best Practices:

During our conversation, several best practices and effective programs that could be incorporated into STEAM were highlighted. As we discussed Virtual Reality (VR) and Coding several programs and best practices were highlighted. Specifically, the programs of CoSpaces, Microsoft’s Minecraft, and Google’s Expeditions program seemed to showcase some

powerful and cost effective technologies. CoSpaces<sup>1</sup> is a program that allows for the creation of 3D spaces that can easily blend the Arts and Sciences. Students can create spaces that can then be translated to some more high powered programs such as Blender<sup>2</sup>/ Unity<sup>3</sup>. CoSpaces allows for Coding within the design framework. This program is easy to use and has freemium and premium features. Teachers from almost all content areas could use CoSpaces for content or STEAM based projects. It can also be used along various devices from tablets to computers.

Microsoft’s Minecraft program has been growing followers especially along the lines of early education and STEAM projects. Minecraft allows digital building, problem solving, coding, and game play. There are varieties of curriculum possibilities including using math concepts that can be embedded into Minecraft<sup>4</sup>. Google’s Expeditions<sup>5</sup> is a free to use program that allows for student to have a guided VR -3D experience. Teachers can use their institution based accounts to guide their students through a variety of pre-created VR experiences from [historical landmarks to robotics laboratories](#). During our conversation about coding, there were a variety of programs shared that highlighted ways to teach computer science along almost any grade level. Some persistent examples included Code.org<sup>6</sup> website that gives STEAM focused projects along a variety of activities and curriculum objectives. Lastly, we had a lot of other programs that offer lots of STEAM based possibilities for educators. The following list was generated.

## Resources for Coding:

- 1 “CoSpaces Edu.” <https://cospaces.io/>. Accessed 15 Apr. 2018.
- 2 “Blender.” <https://www.blender.org/>. Accessed 15 Apr. 2018.
- 3 “Unity.” <https://unity3d.com/>. Accessed 15 Apr. 2018.
- 4 “Lessons | Minecraft: Education Edition.” <https://education.minecraft.net/class-resources/lessons/>. Accessed 15 Apr. 2018.
- 5 “Google Expeditions.” <https://edu.google.com/expeditions/>. Accessed 15 Apr. 2018.
- 6 “Code.org.” <https://code.org/>. Accessed 15 Apr. 2018.

- Unity 3D,<sup>7</sup>
- Minecraft,<sup>8</sup>
- Code.org,<sup>9</sup>
- Codacademy<sup>10</sup>
- Lego League<sup>11</sup>
- Arduino<sup>12</sup>
- Hummingbird Kits<sup>13</sup>
- Scratch Coding Program<sup>14</sup>
- Carnegie Mellon CREATE Lab<sup>15</sup>

## Potential Pitfalls

Some potential pitfalls of STEAM education trended along to conversation threads. Namely, does the definition of STEAM help or hinder their growth and opportunities and are there gender concerns to consider within STEAM degrees and career opportunities. As we began the conversation we discussed the notion of what exactly is STEAM? There were some comments from the group that perhaps the acronym of STEAM has been overused. Certainly, in education there seems to be an overabundance of acronyms and buzzwords, that, as they get played out in education circles become overused which over time seems to dilute the powerful ideas behind them. Contrary to this was a few comments that were highly supportive of STEAM especially along the lines of including the Arts as an essential element. Especially the notion that STEAM focused school cultures can get kids excited about topics that traditionally aren't so exciting. Another area

Another area of potential pitfalls was around the notion of gender issues in STEAM fields and college programs. Some of the works

cited along this were Ali Carr Chellman<sup>16</sup>'s work regarding boys and schooling, as well as, Danielle Feinberg<sup>17</sup>'s work with girls and STEAM. The overall, there seemed to optimism along this topic with many feeling the women are gaining in STEAM and technology fields.

## Recommendations for Future Exploration

One of the concepts that generated some conversation was the role of 3D Printing. This topic combined both the power of 3D building programs with the possibilities of new careers, inventions, and uses of this technology. It is in its infancy, but most if not all participants felt that this is an area ripe for future explorations and powerful possibilities.

## Conclusions

This topic was timely and focused. The thought leaders that participated had relevant suggestions, new ideas, and offered great resources that can be used today. The future of STEAM may have some defining issues going forward, but this is an area that schools need to lead the way, rather than follow behind. There were so many great ideas and places to get new information, that teachers have a treasure trove of options. The engagement in this topic was truly inspiring in its breadth and focus. Educators should feel empowered by the possibilities of STEAM and continue to follow its trends.

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9 "Code.org." <https://code.org/>. Accessed 29 Mar. 2018.

10 "Codecademy." <https://www.codecademy.com/>. Accessed 29 Mar. 2018.

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12 "Arduino." <https://www.arduino.cc/>. Accessed 29 Mar. 2018.

13 "Hummingbird Robotics Kit." <https://www.hummingbirdkit.com/>. Accessed 29 Mar. 2018.

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# Waiting for the VR Evolution

*Paul Rudman*

## Introduction

For decades Virtual Reality (VR) has been waiting for the technology that can make it a reality, moving slowly from the Sensorama of the 1950's (Norman, 2018) to Oculus' Rift. In the four years since Facebook's US\$ 2.3 billion investment in VR company Oculus, VR has become a consumer product, but take-up has been remarkably slow. Meanwhile, educators have begun to investigate the technology's potential – as far as budget, time and other constraints allow.

This quadrivium discussion looked at the mismatch between the enthusiasm of educators for utilizing this technology now, and the slow development of VR generally. Where are we with VR in the education world, and what do we see as the way forward? Twenty-eight people contributed to the conversation; while participants were predominantly from the USA, other countries represented include Australia, France, Italy and the UK.

## Overview of the Main Topics and Ideas brought up

Discussion began with consideration of the benefits VR offers learners, such as empowerment, engagement and an intuitive understanding of concepts. Life can be experienced from other people's perspectives, helping to develop compassion and empathy. Set against this is the cost, both of the technology and of preparing suitable VR learning experiences. VR was seen as having the same potential issues of all computer technology – privacy, consent and ensuring appropriate use – and may also detract from experiencing the physical world. Accessibility was discussed at length. On one hand, because everything experienced in VR is mediated by technology, it should be possible to build accessibility

in from the start. On the other hand, the change from screen-based virtual worlds, such as Second Life, to VR involves an increase in realism, such that some aspects of virtual worlds that supported accessibility (such as text chat and no requirement to physically move) are being lost.

Three questions arising with virtual worlds were discussed in relation to VR. The technology excels at experiential, situated, collaborative and student-led pedagogies, but how and when to apply these for the benefit of learners? At a broader level, given the enormous opportunities afforded by VR, do we need to rethink education from scratch – are we clear about the purpose of education? Finally, does the existing process of testing serve the new forms of pedagogy – or the old ones, for that matter?

The benefits and downsides of gaming were discussed. While there are clear connections between gaming and VR technology, the two were clearly differentiated, with VR needing to find its own path.

Finally, the participants discussed the future evolution of VR. Costs need to reduce, and connectivity, software tools and user hardware need to improve, but this is expected as the wider society take up the technology. Most importantly, our understanding of good practice with this technology needs to advance. This is something we can all be a part of.

## Benefits and pitfalls of VR

### *Benefits*

VR was seen as offering unique environments, experiences and interactions otherwise unavailable. It will allow

the development of communities and collaborations around the world – some problems can only be solved globally. It can promote empowerment, engagement and empathy and the intuitive understanding of concepts. In particular VR can make education more experiential, with lessons learned through thoughtful trial.

The almost complete feeling of “elsewhere” in VR allows attributes of the physical self, classroom and school context – “baggage” – to be left behind; the learner can be more “present” in the experience than if it took place in the physical world.

The example was given of a student who wants to be an astronaut; his teacher was able to give him a feeling for what that would be like using VR through the Oculus Rift. Another participant used the VIVE to show a student around the International Space Station.

VR has great potential for developing compassion and understanding, with its ability to experience the world from someone else’s perspective. Nonetheless, one participant warned against over-estimating the technology.

### ***Pitfalls***

Cost was a major factor for many participants. A VR headset may cost hundreds of US\$, while one participant explained that their annual technology budget is US\$ 1,000.

As with other computer use, privacy, consent and the possibility of adult content were seen as important areas to address. This may be more difficult in VR because of the large amount of data a system could collect, although it was also argued that existing approaches to online safety could be adapted.

The amount of time spent in VR was a concern. Educationally, this may appear as a need to “game” everything, with children only able to learn when they are entertained. More generally, there was the concern that children may miss out on physical-world experiences. It was seen as important to present VR as a place to visit, rather than a place to live.

### ***Disability / Accessibility***

Experience with virtual worlds has shown the potential benefits of this form of technology, whereby physical attributes, such as appearance and ability to move, become irrelevant to social interaction. With the easy use of text, speaking and listening also become less important.

VR attempts to make the virtual world experience more like that of the physical world, using wrap-around vision, 3D audio, gesture control and other mechanisms now on the horizon. However, in making VR more like the physical world, features that supported accessibility may be lost. For example, one participant described how being deaf was easily addressed in the Second Life VW by using text chat, whereas in Sansar, a virtual world designed for VR, text is not properly supported, and since the environment uses avatars, lip-reading is not possible. Therefore, for someone without hearing the “improvement” of making a virtual world more realistic can actually make it almost impossible to use.

This need not be the case. Since everything in VR is mediated by computers, there is great potential to incorporate accessibility into these systems. For example, the technology exists to provide real-time voice to text and text to voice conversion, which would be of great assistance in the above example.

It was agreed that it is vital to address accessibility for these spaces to be available to everyone. Technologies, such as artificial intelligence and voice-text conversion, are already used elsewhere and could be utilized. The advent of VR is a great opportunity to incorporate accessibility into the experience from the beginning, rather than add it later as is happening in the physical world.

It may be that VR can benefit from other areas of research into accessibility, such as the University of Melbourne’s (2017) work with older people, or new technologies, such as haptics. Again, cost was seen as a limiting factor, with the suggestion that the gaming community was more financially capable of addressing this, and thus more likely to do so.

## Unresolved virtual space questions

Many issues and questions that have arisen in using virtual worlds for educational purposes also apply to VR.

### *Which pedagogies are most suited to VR?*

VR is well suited to learning that is experiential, situated, collaborative and student-led. The 3D experience was seen as improving the retention of learning through applying concepts – it embraces how the child learns most naturally, meeting them where they are.

Examples mentioned were Cooper Patterson's subQuans (teaching maths using a game), Jenova Chen's research on flow (matching difficulty to learning & interest), the Philosophy for Children project (to develop reasoning skills), the work of Jaron Lanier, the SRA self-paced learning series from the 1960s / 70s, and current practice at British Columbia (2018).

Teachers may need to "unlearn" some existing ideas about teaching, creating "21st century teachers for 21st century students". One approach could be to try to think like children – to connect with our inner child – play, find what interests us; the inner child can provide the excitement for learning. With this approach, education is the journey of the child, and children are the guides for their teacher. VR may engender this approach – we may all learn to play again. Madame Montessori, and the subsequent school system, was given as an example of this approach.

Two other approaches were suggested: the "flipped classroom", with work at the University of Indiana offered as relevant, and a mentor / apprenticeship model, to take advantage of the collaborative and distance-irrelevant properties of VR.

### *What is the purpose of education?*

Deciding how to use a new, powerful technology for teaching inevitably invites discussion on what to teach, and thence to what purpose. To what extent should education prepare learners to be winners, to be employees, to be independent learners, to be good

members of society, to be happy?

Discussion centered around "happiness". Clearly, "being happy" is not a required attribute for university entry. However, it was pointed out that the U.S. Declaration of Independence includes the right to "Life, Liberty and the pursuit of Happiness". One participant suggested that this should be seen as Aristotle's idea of the "pursuit of the virtuous life". It was suggested that happiness is not a passive state and requires some form of challenge, although it was also pointed out that some people want to acquire happiness, not be challenged to find it themselves.

In terms of the daily experience of education, happiness was seen more as excitement, inspiration and joy – something VR is well placed to instill. Achieving these in students would allow them to find their own forms of happiness.

It is also a question of what today's students will need over the next 50 years or more, in both the workplace and society. They need the skills, not just to flourish in the world they find themselves in, but to create the kind of world they want to inhabit.

### *How to measure learning in VR?*

Standardized tests were seen as problematic as a measure of learning in relation to virtual spaces. In particular, VR can provide learning environments that encourage individual creativity and allow skills that matter to develop. If learning is individualized in this way, testing needs to be tailored to the individual's learning. We would need to move away from the idea of "some set of fundamental standards of what kids should know by the time they graduate high school, or university", and the standardized high-stakes testing this leads to.

Nonetheless, those responsible for funding VR will want to see some demonstration of effectiveness. "Assessment" – observable achievements in mastering skills and concepts – might be better term than "test", with a move away from summative assessments towards more open, formative, ongoing assessment mechanisms – a description of what it is that the student is engaging in and understands. (British Columbia (2018) was

given as an example of this approach.) VR may offer a solution: since everything is mediated by technology it may become practical to automate assessment by analyzing the sum of each student's interactions.

This question relates to both the purpose of education and the expectations of students, employers, universities and society in general. Students can be unnerved by exercises without a clear grading system – they have learned that the grade is what is important, and are afraid of “failure”. In society, grades are easily understood and compared, even if they do not properly reflect ability or learning, and have become the primary measure of educative success.

It was suggested that expertise is becoming so fragmented and specialized that employers already need to look beyond grades for selecting their employees. Google was given as an example, in requiring demonstration of competency and skill, and not necessarily requiring a degree.

### ***What is the relationship with gaming?***

Gaming (engaging with virtual world-style, or VR environments built for a specific game) was seen as promoting perseverance, strategic thinking and exploration. Gamers learn to adapt quickly to new games without being given instructions, learning from and teaching each other. They may benefit from looking at life as a game – “what does it take to win at the game of life?”. They may even be considered “a new type of learner” when it comes to classroom practice, even though there is a large diversity in gamer behavior (Yee, N., 2004, 2005; Bartle, R., 1996; Sykes, J. 2008).

For students who excel in gaming, these environments may be more effective for their learning than the typical classroom. The example was given of “Gaming the Classroom” from Prof. Lee Sheldon (Indiana University, 2010), where tasks are described in gaming terms, and achievements can be rewarded quickly with “points” or other status rewards.

In particular, failure may be redefined as an opportunity to learn how to do better next time, rather than the trauma it can easily become, with the teacher supplying

guidance to help them along. The aim is not to eliminate failure, but to show learners how to identify, celebrate and recover from failure, try again, and do better next time. VR supports this approach: one can “fail” without the damaging consequences often associated in the physical world.

Not all students are gamers, and some do not see gaming as a valid learning environment. Conversely, some gamers do not like the virtual environments used in education; an educational VR simulation may look like a game, but to a gamer it is very different. In particular, there is no clear way to “win”. In addition, the complex builds that the game industry is used to are often not necessary for learning, since there can be benefits in abstracting the critical points of a topic to make them clearer.

Thus, while we can learn from gaming in many areas, VR is not synonymous with gaming. Competition, levels, points, team working and winning belong to a specific form of pedagogy. It is important for education through VR to find its own form. The general feeling was for one of “focused playfulness”, where the learner is encouraged to explore a VR learning environment with the goal of understanding, in collaboration with other learners.

## **The VR Evolution**

### ***Waiting for the VR Evolution***

The main changes that the participants are waiting for are those of cost reduction and funding availability, improved connectivity and bandwidth, and credible practice.

While the hardware – currently the Head Mounted Display (HMD) – will undoubtedly continue to improve for a long time, the problem of vertigo was the only one mentioned as a functionality issue; this problem is being worked on and is expected to be resolved soon.

VR software does not yet provide tools that are easily appropriated for creating educational experiences, compared to existing virtual world tools. More support from companies who provide the HMDs or educational



software would be helpful. VW experiences available at present tend to be “gimmicky” – VR needs more than impressive visuals. There are the beginnings of innovative content, for example the use of physicality to explore abstract concepts – educational VR does not have to mimic the physical world – but more pioneers are needed to build up a body of credible practice.

Above all, just as the internet became a part of contemporary pedagogy, so VR needs to become mainstream in society before it can take off in education. The VR evolution begins in the homes of students.

It was suggested that augmented reality will become ubiquitous before VR, and will support people with disabilities better than VR. However, the general view was that VR and augmented reality will co-exist, evolving with their own applications, with educators using the appropriate tool at the appropriate time. As with radio and television, new technologies do not need to supersede older ones. Indeed, there will always be a role for pen and paper and people talking face-to-face.

### ***Preparing for the VR Evolution***

The general view was that it was not a case of passively waiting for the VR evolution to arrive, but rather one of looking for ways to hasten its arrival. Just as the internet became ubiquitous because of the myriad things it offered, so there may be no single “killer app” for VR. We will get there by creating and by evolving and by building rather than by waiting, and by effectively showing and explaining what we do to bring others in. The more VR is used in the classroom – and that use is justified – the more people will get on board.

In addition, the more that educators, and system and content developers can get together and talk (and play) with what is available, the more educators can help steer VR in appropriate directions.

In general, once students use VR, they love it and stay forever. They are totally convinced by this type of learning. However, getting people to stop being afraid to come in is the trick.

It was mentioned that there are very strong use cases for

VR in industry for specific skills training; we would do well to follow developments in this area.

### **Conclusions based on the discussion**

One can see a parallel between the rise of VR and that of virtual worlds over a decade ago. A new technology appears in society that offers new and powerful experiences. A few pioneering teachers work hard to utilize the technology in their classrooms, overcoming barriers, often with transformative success. Research projects demonstrate the technology’s potential. Then what?

Virtual worlds did not go away, but have not become mainstream. VR has much to offer, with a huge potential for education. That, however, does not guarantee it will see greater adoption than its predecessor. The discussion overall covered two essential strands of VR evolution that need to occur. Firstly, society at large needs to take up VR so that it becomes a regular and accepted aspect of life, just as artificial intelligence is becoming accepted with the advent of “smart speakers” such as the Amazon Echo. Once VR is a regular part of life, it can become a regular part of education, as the internet has become. During this process, any opportunity to encourage the development of accessibility tools needs to be taken.

The second strand is for educators and researchers. There needs to be a body of credible practice – ways of using the technology that are known to be effective and successful. We are in the early stages of VR’s evolution, with many questions as yet unresolved. VR offers new forms of learning experience, and may transform some areas of learning from impractical to easy. The questions arise, which areas would benefit from being taught through VR, and, should we teach new areas if they become easy in VR? Then, there is the question of how we should assess learning. A student wants to become an astronaut; they experience the International Space Station in VR; what should they have learned and how can that be assessed? Standardized testing was generally considered to be problematic, with a more formative, ongoing assessment seen as more appropriate for learning in VR.

Our students are the next generation; VR may be able

to help them prepare for all aspects of life, for shaping the world as they would like to see it. Nonetheless, budget, institutional and governmental factors have to be taken into account. The evolution of VR into the classroom needs to fit within a complex reality. For the quadrivium participants, this brought into question the whole purpose of education. It may be that VR becomes a disruptive technology, changing – or facilitating the change of – education in general.

Finally, there may be no single “killer app” to wait for with VR, just as smartphones became ubiquitous because of the wide variety of apps available. To hasten VR’s evolution, the work of pioneers and early settlers in the use of VR for education needs to come together in ways that others can easily follow and build upon. It is the task, not the technology, that engages students. Provided the technology becomes widespread, it will be the community of educators who can make VR evolve into a significant part of education.

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### Author’s note

The ideas in this paper come from the quadrivium participants, with much of the text either direct quotations or paraphrases. I have merely tried to link the words and ideas into a coherent story, retaining the original context and meaning as far as possible. In line with previous quadrivium papers, I have not named individual participants’ contributions; the paper represents the group as a whole. Correspondence concerning this article should be addressed to papers@paulrudman.net.

# GENERAL PROGRAM

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Anabel Nowak/Ann von Rhein (Avatar)

*Educators and Trainers*

## **Blending VWs & Digital Tech. in Language Teaching**

*This presentation deals with teaching immersive English literature by blending 3D worlds, machinima and other external digital tools.*

*In this project students practice English while having the chance to use different platforms and devices in order to train 21st century skills.*

Participants will be able to learn how digital technology and new ideas can easily be incorporated in language syllabi in order to revolutionize teaching.

**Format:** *Spotlight Presentation*

**Keywords:** 3D worlds, machinima, 21st century skills, digital technologies.

**Track:** Collaboration and Distance Connections

**Presenter(s)**

Hsiao-Cheng (Sandrine) Han/Kristy Handrick (Avatar)

*Educators and Trainers*

## **A Hybrid Conference as a Way to Create Community**

*This presentation provides an example of how to host an academic virtual world conference that uses Second Life and Google Hangout on Air with zero budget for long term impact and presents findings regarding the advantages and challenges of a virtual world conference. The goal of an online virtual conference is to reach out to an increased number of people and to create community. I suggest a hybrid approach to hosting a virtual conference and discuss the future possibilities of virtual conferences.*

Participants will be able to know how to use hybrid approach to host a virtual conference.

**Format:** *Spotlight Presentation*

**Keywords:** Virtual Conference, Hybrid Conference, Community

**Track:** VWBPE Redux

**Presenter(s)**

Alyse Dunavant-Jones/AlyseDunavantJones (Avatar)

*Libraries*

## **Virtual Worlds Database: Crowd-Sourcing Our Worlds**

*CVL's Virtual Worlds Database educates and connects virtual world users and communities regardless of their virtual "home" worlds. It is the first online database striving to include all virtual worlds. It creates connections between virtual worlds and the Web that must exist before the Metaverse can become reality. CVL is also using the database's collections to establish best practices for collecting and organizing virtual world information and to contribute to virtual world documentation.*

Participants will review the database's collections of communities, landmarks, and resources.

Participants will be able to access, contribute to, and volunteer to assist with the database.

**Format:** *Spotlight Presentation*

**Keywords:** Virtual Worlds Database; crowd-sourcing; libraries; collaboration

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Mary Ellen Gordon/Pebbles Hannya (Avatar)

*Educators and Trainers*

Aaron Griffiths/Isa Goodman

*Coders, Scripters, and System/IT Analysts*

## **Avatars as Data Points**

*This presentation will introduce a new approach to teaching basic data science by using avatars as data points in data visualizations. The approach is intended to make this topics more approachable -- particularly for those who may have math anxiety or limited prior quantitative background.*

Participants will be able to conceptualize how virtual worlds can be used to teach basic data science concepts.

Participants will be able to access four data visualizations in Second Life to enhance their own understanding of basic data science or to help others do so.

**Format:** *Spotlight Presentation*

**Keywords:** data science, data visualization, math anxiety, statistics



**Track:** Collaboration and Distance Connections

**Presenter(s)**

Ulli Berthold/Torgon Woodget (Avatar)

*Coders, Scripters, and System/IT Analysts*

## Low Threshold Virtual Events

*Starting with a short talk on how, currently, setting up a virtual conference requires a lot of time and technical experience, I plan on showing the presentation participants a way to stage their own virtual events, simply.*

*Guided by a slide show presentation, and visible as a YouTube stream, I'll showcase the VirtualExpo system. Participants can visit the new exhibition, even while it is still being set up, using their web browsers, or a viewer for PC and Mac (incl. Steam VR), and mobile.*

Participants will be able to set up a virtual conference or exhibition in less than an hour.

**Format:** *Spotlight Presentation*

**Keywords:** conference,virtual,simple,fast

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Toni Hebda/IndianapolisCCN (Avatar)

*Educators and Trainers*

Karen West/Atlanta Highmist

*Support and Help Communities*

## Nursing Informatics Student SL Practicum Outcomes

*Learning outcomes for students completing a practicum in Second Life were compared against those completing a traditional practicum using a quantitative, quasi-experimental, post-test-only study. An adaptation of the Nursing Informatics Competency Assessment Level 3 and Level 4 (NICA L3/L4) instrument, which included only level-three competencies, was used. Interim findings, study issues, and possible implications are discussed.*

Participants will be able to provide an overview of SL as an option for graduate student practicum

Participants will be able to discuss interim study findings and implications for future practicum experiences

**Format:** *Spotlight Presentation*

**Keywords:** virtual mentoring, nursing, graduate competencies, outcomes

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

G Ronnie Kraegel/Namaara MacMoragh (Avatar)

*Advocacy and NonProfit*

## **Etopian Evolution for Real World Solutions**

*As an ever evolving project, Etopia is designed to bridge SL and RL by providing safe, educational space and activities for skills exploration with partners such as Peninsula College and Brain Energy Support Team. The benefits of learning social, sustainable, and behavioral skills in a virtual world give participants the opportunity to create a better quality of life for themselves and the communities they are in.*

Participants will learn how Etopia has integrated real life solutions into the Second Life experience.

Participants will learn how a mutually supportive community experience can address real world environmental and social challenges.

**Format:** *Spotlight Presentation*

**Keywords:** Sustainability, Immersion, SL

**Track:** Ethics, Responsibility, and Tolerance

**Presenter(s)**

Rebecca Sisk/Jeckybean Galaxy (Avatar)

*Educators and Trainers*

## **DeDe the transwoman: Cultural Issues & Second Life**

*The purpose of this presentation is to describe a scripted simulation related to gender transition for graduate students in nursing education. DeDe is a trans-woman who enters a clinic with pain and encounters ridicule and resistance from staff. Students apply ethical principles related to cultural competence (knowledge), communication skills (skills), and cultural humility (attitude) and build a toolbox for healthcare staff to care for the "other" and to provide person-centered care.*

Participants will be able to discuss scripted virtual simulations related to cultural diversity.

Participants will be able to discuss debriefing to elicit virtual discussions related to culture.

**Format:** *Spotlight Presentation*

**Keywords:** virtual simulation, ethics, gender transitions

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Yen Verhoeven/TheoreticallyBlue Resident (Avatar)

*Educators and Trainers*

## Virtual Self-Directed Learning Workshops

*We present an overview on the design and implementation of self-directed learning (SDL) workshops in Second Life. Using the popular project-based workshops taught by Blu Heron at the Builder's Brewery as a model, come learn about how SDL may be implemented in innovative ways "where students work at their own pace on their own projects in an immersive classroom environment. SDL theories, processes, and practical applications will be discussed.*

Participants will be able to understand the research-based theory and practice of SDL.

Participants will be able to apply concepts from an SDL-based model toward classroom practice.

**Format:** *Spotlight Presentation*

**Keywords:** self-directed learning, virtual pedagogy

**Track:** Analytic Thinking and Complex Problem Solving

**Presenter(s)**

Yen Verhoeven/TheoreticallyBlue Resident (Avatar)

*Educators and Trainers*

## You're Grounded! Theorizing Virtual Learning Space

*The digital landscape has opened a range of possibilities for understanding the different ways we learn in a virtual environment. To explore these ways, a new multi-dimensional learning theory, called Interactive Spatial Learning Theory (ISLT), was developed from a qualitative study in Second Life using constructivist grounded theory (GT) methodology. This presentation showcases how this methodology led to the development of ISLT and presents virtual world examples of its application.*

Participants will be able to understand the use of GT methodology to study virtual spaces.

Participants will be able to provide feedback with regard to a new theory of learning.

**Format:** *Spotlight Presentation*

**Keywords:** learning theory, interactive space, virtual learning

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Carolyn Lowe/Clowey Greenwood (Avatar)

*Educators and Trainers*

Amy Pihlainen/Elsie Ocello

*Educators and Trainers*

## If They Build It, They Will Come!

*The authors, working with children ages 10 through 14, have found that allowing the students to create the learning spaces increases engagement, deep learning, and motivation to learn and do more. This presentation will demonstrate this through showcasing the many learning activities accomplished by the children and include the childrens' reflections on the experience.*

Participants will be able to describe examples in which children created their own virtual learning experiences.

Participants will be able to express the benefits of having children building in a learning environment.

**Format:** *Spotlight Presentation*

**Keywords:** Virtual world, children, building, learning

**Track:** Analytic Thinking and Complex Problem Solving

**Presenter(s)**

Wendy L. Keeney-Kennicutt/Julia Tiraxibar (Avatar)

*Educators and Trainers*

## Chemistry Experiments in Virtual Worlds

*The design, implementation and assessment of college-level chemistry experiments conducted in Second Life suggest that VWs can be effective for teaching chemistry laboratory. In this pilot study, 55 students successfully completed two virtual experiments and showed learning gains similar to 67 students who performed identical real world experiments, as shown by pre/post quizzes and a practicum. Students held positive views of their virtual experience; teaching assistants had mixed opinions.*

Participants will be able to better translate a physical lab experience to VR for students and TAs.

**Format:** *Spotlight Presentation*

**Keywords:** chemistry, laboratory, experiment, undergraduate

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Barbara McQueen/Barbara Novelli (Avatar)

*Educators and Trainers*

## How to Get There from Here

*Teachers are often unnerved by how much they need to learn to best use virtual worlds as a part of their technology arsenal. So they don't use virtual worlds or only use them in a very limited way. This presentation will detail:*

- *The most important virtual world skills to learn and fun ways to teach them*
- *Simple to complex games and roleplays that deeply immerse students*
- *Tasks for blogs, Moodle, Skype, machinima, social media, online conference rooms, and other educational software and devices*

Participants will be able to create virtual classes that are flipped, gamified, and student-led.

Participants will be able to modify the presented tools/techniques to enhance teaching any subject.

**Format:** *Spotlight Presentation*

**Keywords:** gamification, flipped classrooms, task-based, Open Sim

**Track:** Ethics, Responsibility, and Tolerance

**Presenter(s)**

Hsiao-Cheng (Sandrine) Han/Kristy Handrick (Avatar)

*Educators and Trainers*

## Cultural Appropriation? Cultural Appreciation?

*This presentation describes the findings from Visual recreation, culture appropriation: An Asian artist's perspective of virtual world visual culture. This research is based on my previous research on the Third Culture and asks if we should be open minded and generous to recreated virtual builds that might appropriate a culture? Should we view virtual builds as artistic creations with freedom and without context? Or should we view virtual builds as cultural creations and be mindful?*

Participants will be able to reconsider virtual culture development from an Asian perspective

Participants will be able to review the ethics of cultural objects recreation in virtual worlds.

**Format:** *Spotlight Presentation*

**Keywords:** Third Culture, Cultural appropriation, cultural appreciation



**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Renne Emiko Brock/Zinnia Zauber (Avatar)

*Educators and Trainers*

## **Liberate Agency Amplification Via Avatar Identity**

*Let go of control. Instructors empower students through agency with active learning ownership, not with ultimate authority. Build validating lessons prior to entering virtual situations with surprising personal investigation, mood board creation, and character sketches. Develop education buy-in through accelerated and immediate avatar customization to reveal individuality and unlimited potential. Use reflection exercises to reveal how this experience exposed their real investment in themselves.*

Participants will be able to utilize revelations of student's motivation via avatar development.

Participants will be able to foster personalized research, design, documentation, and blogging.

**Format:** *Spotlight Presentation*

**Keywords:** Agency authentic avatar customize student-focused

**Track:** Collaboration and Distance Connections

**Presenter(s)**

Cynthia Calongne/Lyr Lobo (Avatar)

*Educators and Trainers*

Bradley Hodgins/Zalomar Resident

*Educators and Trainers*

## **Bridging Worlds: Learning in a Strange Land**

*Learning in 3D comes alive through the mind of eight-year-old Jack. Join us as we explore the creation of Jack's World, a Jurassic simulation that runs on OpenSimulator at Virtual Harmony. Virtual Harmony is a participatory design, community, and classroom space, hosting a collection of games, simulations, contemplative spaces, and immersive experiences that span research, education, social good and values-based leadership.*

Participants will discover student perspectives on the benefits and challenges of studying and holding classes across different virtual worlds.

Participants will explore the student projects, the technology challenges, and how the students took their ideas and modeled them in OpenSim, an open source virtual world.

**Format:** *Spotlight Presentation*

**Keywords:** modeling, simulations, games, education

**Track:** Collaboration and Distance Connections

**Presenter(s)**

Julie LeMoine/Juliein3D (Avatar)

*Artists, Designers and Builders*

## **Flying Stickies, Easy Quests, VW + Unity for Edu**

*The presentation will summarize a new and emerging virtual world API running on the Unity game engine that offers a lot of creation flexibility from a VW classrooms without requiring much coding. A set of insights on this merging VWs with Unity will be presented. Much of the presentation will be framed in a real use case - a 3D classroom from the 2017 fall semester and will cover how this particular VW API on Unity enabled the rapid, no-code creation of engaging NPC interaction (quests) and how 3D sticky notes and other collaboration tools were added to amp up engagement.*

Participants will learn about a new VW on Unity, Sine-space, and learn the basics of the new VW's 3D quests creation tool.

**Format:** *Spotlight Presentation*

**Keywords:** Unity, VW, game engine, quests

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Valerie Hill/Valibrarian Gregg (Avatar)

*Educators and Trainers*

Robin White-Sieber/Sparkybear Mandelbrot

*Artists, Designers and Builders*

## **Innovative Virtual Libraries: Research & Design**

*Virtual world librarianship requires innovative design to help educators and learners connect and find authentic and accurate information. Librarians and an Artist/Designer share examples of collaborative team design to build a virtual world library with plans to expand to web-based worlds allowing easy access for all. The move and design of the Community Virtual Library, the process of creating the Dickens Project Resource Center and Digital Citizenship Museum in Kitley will be featured.*

Participants will be given specific examples of collaboration in virtual world design to illustrate the processes that support sharing expertise and talent as a team to achieve the organization's mission.

Participants will have the opportunity to view collaborative virtual world design through examples of real librarianship with access for all types of learners.

**Format:** *Spotlight Presentation*

**Keywords:** collaboration, virtual world libraries, space design, virtual world exhibits

**Track:** Ethics, Responsibility, and Tolerance

**Presenter(s)**

Marie Vans/amvans lapis (Avatar)

*Educators and Trainers*

Valerie Hill/Valibrarian Gregg

*Educators and Trainers*

## Improving Digital Literacy - A Solvable Challenge using Virtual Worlds

*Virtual World librarians are positioned to lead efforts to develop digital citizenship by developing programs that assist in the mastery of responsible and appropriate technology use, including online identity, communication etiquette, and rights and responsibilities by learners. We present the definition of digital literacy and the very solvable challenges faced by educators and students. We also include possible solutions and call for the creation of a digital literacy lifecycle model.*

Participants will have an understanding of the challenges and issues for becoming digitally literate

Participants will understand how to engage others in meaningful conversation on digital literacy.

**Format:** *Spotlight Presentation*

**Keywords:** Digital Literacy, Digital Citizenship, Librarians

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Presenter(s)**

Ana-Despina Tudor/Ariadne Sayre (Avatar)

*Educators and Trainers*

Shailey Minocha/Shaily Garfield

*Educators and Trainers*

## Mobile Virtual Reality for Environmental Education

*Google Expeditions (GEs) is a mobile virtual reality app consisting of over 700 expeditions or guided field trips that students experience on a smartphone through a virtual reality (VR) viewer. Through a case study, we will describe the role of virtual field trips (VFTs) as in GEs in imparting environmental education. Through an analysis of students' experiences, we will show how VFTs as in GEs connect the learning from an international context to a local context in geography fieldwork.*

Participants will learn how mobile VR as in GEs bridges virtual fieldwork with physical field trips.

Participants will learn about the role of VFTs in improving the effectiveness of outdoor fieldwork.

**Format:** *Spotlight Presentation*

**Keywords:** affordance, virtual reality app, outdoor fieldwork

**Track:** Collaboration and Distance Connections

**Presenter(s)**

Katherine Hewett/TwelfthNight (Avatar)

*Educators and Trainers*

Mary O'Brien/Serena Offcourse

*Educators and Trainers*

Beth S. O'Connell/Beth Ghostraven

*Educators and Trainers*

Kim Harrison/Thunder Insippo

*Educators and Trainers*

technical and online safety challenges educators face when integrating Minecraft in educational spaces.

**Need to know:** Participants will be able to explore what 21st century skills and behaviors students exhibit when playing and building in Minecraft.

**Stance:** Participants will be able to apply current strategies for integrating Minecraft in educational settings.

**Keywords:** Minecraft, Collaboration, Creativity, Innovation

## **The Minecraft VRevolution: Collaborative Learning**

*The session features an panel of educators actively utilizing Minecraft in educational settings. Participants will explore how Minecraft can be utilized as a tool to motivate and engage young 21st century learners. Diverse examples of integration will be presented for participant consideration. The panel will discuss creative and innovative ways to integrate Minecraft and tips on how to provide opportunities for students to collaborate, create, and problem solve in meaningful ways.*

Participants will be able to engage students in learning practices utilizing Minecraft for instructional use.

Participants will be able to apply strategies for implementing and integrating Minecraft into educational settings.

**Format:** *This is a Compass Points roundtable discussion, where the discussants will address the following four points on the compass:*

**Excited:** Participants will be able to explore the benefits of video game integration in various educational settings and learn how Minecraft can engage 21st century learners.

**Worrisome:** Participants will be able to explore the

**Track:** Ethics, Responsibility, and Tolerance

**Need to know:** What are the potential NPC benefits and challenges in the next year?

**Presenter(s)**

**Stance:** How can other virtual world residents get involved and help?

Cynthia Calongne/Lyr Lobo (Avatar)

*Educators and Trainers*

Joyce Bettencourt/Rhiannon Chatnoir

*Advocacy and NonProfit*

Renne Emiko Brock/Zinnia Zauber

*Educators and Trainers*

Buffy Beale

*Advocacy and NonProfit*

Valerie Hill/Valibrarian Gregg

*Advocacy and NonProfit*

**Keywords:** virtual worlds, social good, nonprofit, technology education

## **NPCevolutions Panel for the Non-Profit Commons**

*The NonProfit Commons creates opportunities for social good through collaboration, education and mutual support in virtual worlds. In our 11th year, we moved to a peer-led model, organizing progressive parties as multi-organization events, hosting weekly meetings and educational events, revamping community offices, and welcoming more diverse groups focused on social impact.*

Participants will discover the new plans, technology programs, and opportunities to get involved.

**Format:** *This is a Compass Points roundtable discussion, where the discussants will address the following four points on the compass:*

**Excited:** How has the NonProfit Commons changed in the last year? What is your role in facilitating this change?

**Worrisome:** What are your goals for 2018 and beyond? What will it take to create a sustainable NPC program in virtual worlds?

**Track:** Multimedia Communication and Multifaceted Interactions

tactics to implement those revolutionary possibilities?

**Stance:** What immediate tactics allow you to seize opportunities based on those revolutionary possibilities?

**Presenter(s)**

Kae Novak/Kavon Zenovka (Avatar)

*Educators and Trainers*

Cynthia Calongne/Lyr Lobo

*Educators and Trainers*

Chris Luchs/Abacus Capalini

*Educators and Trainers*

Trish Cloud/Trish Cloud

*Educators and Trainers*

**Keywords:** think tank, emerging technologies, virtual reality, augmented reality

## **Meta Manifesto: Think Tank 4 Effective Tactics**

*Using the learning that happens outside the classroom, let's go META by considering the Most Effective Tactics Available. This round table invites participants to a think tank on tactics for virtual worlds (VWs), virtual reality (VR), augmented reality (AR) and games. As we look beyond the hype and disillusionment, the session asks the participants to brainstorm actions to support our current and future directions. What can we do to shape the future? What is our Manifesto moving forward?*

Participants will be able to draw connections between learning and emerging ideas and formulate a plan for looking at future innovation.

**Format:** *This is a Compass Points roundtable discussion, where the discussants will address the following four points on the compass:*

**Excited:** What are the revolutionary possibilities with VR, AR, VWs and MOOs that go past best practices?

**Worrisome:** What is stopping us from implementing those revolutionary possibilities?

**Need to know:** What do we need to develop effective



**Track:** Analytic Thinking and Complex Problem Solving

**Presenter(s)**

Lisa Laxton/Lisa Laxton (Avatar)

*Research and Development Community Foundation*

Cynthia Calogne/Lyr Lobo

*Educators and Trainers*

Singergirl Mode

*Business and Entrepreneurs*

Dieter Heyne

*Coders, Scripters, and System/IT Analysts*

Gentle Heron

*Support and Help Communities*

ogy evolution?

Need to know: What are the social virtual reality challenges to be overcome?

Stance: How can educators and researchers get involved to help shape the future of social virtual reality?

**Keywords:** social virtual reality

## Use Cases for Social Virtual Reality

*Many virtual world technologies are available today in the social virtual reality realm. Because teachers and researchers often do not share institutional data, choosing the best technology can be a challenge. Each use case requires analytical thinking to solve problems considering: virtual world design rationale; features associated with social use; security requirements; and accessibility. Panelists will present use cases and solutions. Compass point discussion will follow the presentations.*

Participants will be able to learn innovative approaches to educational virtual world use cases.

Participants will be able to learn about Infinite Metaverse Alliance and reasons for engagement.

**Format:** *This is a Compass Points roundtable discussion, where the discussants will address the following four points on the compass:*

Excited: What are the recent advances in virtual world technologies today?

Worrisome: What needs remain that can drive technol-

**Track:** Collaboration and Distance Connections

**Presenter(s)**

Thuja Hynes (Avatar)

*Advocacy and NonProfit*

Lissena

*Advocacy and NonProfit*

## Our Brains, Ourselves, Our Worlds

*A Virtual Interactive Model of the Five Pillars of Whole-Brain Health connects the goals of healthy Neuroplasticity and Collective Learning. Participants learn brain structure and function as they engage in a spectrum of activities, capture their experiences digitally in images and text, and contribute these to a collaborative document. We then correlate that information to regions of a walk-in anatomically correct model of the human brain. The result is a hologram of our collective understanding.*

Participants will actively discover how the 5 pillars of whole-brain health can be applied to their own lives.

Participants will use voice, text, captured images, and movement to

build a collective neural map and understanding

**Format:** *Hands on Technology Workshop*

**Keywords:** Collaborative Interactive Brain Hologram

**Track:** VRvolution

**Presenter(s)**

Facilitator: PD Alchemi/Paul Rudman

Assistant: Amari DiRicchezi/Zia Rivera-Clarkson

## Waiting for the VR Evolution

*Meet us at our quadrivium where we hope to entice you into a discussion on the VR Evolution. For many who have embraced change and have been early adopters, waiting for the rest of the world to catch up has not been easy. Join us for a discussion on surviving until the change happens and catches up to everyone else. Bring your ideas and join us for an engaging quadrivium discussion.*

**Format:** *Networking Quadrivium*

**Keywords:** innovation, change

**Track:** VRevolution

**Presenter(s)**

Facilitator: Spiff Whitfield/Andy Wheelock

Assistant: Elektra Panthar/Elisa Segoni

## **Future of STEAM**

*Meet us at our quadrivium where we hope to entice you into a discussion on the future of STEAM (science, technology, engineering, arts, math) education. This interdisciplinary is fast becoming a calling for skills that produce innovation. How do we prepare students for this? Bring your ideas and join us for an engaging quadrivium discussion.*

**Format:** *Networking Quadrivium*

**Keywords:** STEAM, innovation

**Track:** VRevolution

**Presenter(s)**

Facilitator: Linda Sautereau/Peggy Daniels Lee

Assistant: Amvans.Lapis/Marie Vans

## **Digital Makerspaces**

*Meet us at our quadrivium where we hope to entice you into a discussion about digital makerspaces. While makerspaces are not new, the term is, and with it a new connotation around what creates a space for those who wish to tinker and innovate, can go to do it. What makes for a good digital makerspace? What are some examples? Bring your ideas and join us for an engaging quadrivium discussion.*

**Format:** *Networking Quadrivium*

**Keywords:** makerspaces, innovation

# IMMERSIVE EXPERIENCES

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Host(s):**

Niela Miller/Marly Milena (Avatar)

## Making Discoveries with SL Creative Processes

Using arts-based processes and tools such as building shapes, digital art, and a drawing board, we will explore how the representation of ourselves and our experiences in and out of a virtual world can lead to insight, new perceptions, and creative inspiration. We will also demonstrate how these tools can be useful for educators wanting more engaging ways to interact with their students and material.

Participants will learn several ways to symbolically model their feelings, values and/or ideas with arts-based processes.

Educators will be able to introduce interactive, expressive, experiential ways to engage their students in SL in the exploration of any subject matter or behavioral investigation.

**Format:** Virtual World

**Venue:** 3D Virtual Environment

**Track:** Analytic Thinking and Complex Problem Solving

**Host(s):**

Dragon Shichiroji (Avatar)

## Immersive Tribal Quest

Take part in a fascinating and enhanced immersive adventure designed by Mystic Academy, in which you take the role of the Explorer, discovering and learning about the wisdom and myths of indigenous cultures such as the Native American, Vedic, Aboriginal and the Incas and beyond earth.

Participants will have much fun learning and gaining greater appreciation for these cultures which contain much value, hope and timeless wisdom for the modern world.

You will get the reward of a great set of gifts at the end to help you to go onward and also build other communities.

Participants will embed both the learning of SL basic controls as well as the 5 ways of Wellbeing that include - Taking Notice, Giving, Keeping Active, Connecting with other participants and Learning

Participants will be able to broaden their perspective of the common universal themes in mythology and to foster a greater respect for international cultures

**Format:** Wanna Play?

**Venue:** 3D Virtual Environment

**Track:** Analytic Thinking and Complex Problem Solving

**Host(s):**

Brant Knutzen/MrK Kas (Avatar)

## Venice in 1600

Based on findings from my prior research (The Quest), this immersive experience will introduce participants to the impact that an idealized virtual identity and the perception of a social constructivist environment have on learning within the virtual world. Gamified learning as a group process will be explored, and data collected on affective issues such as beliefs and attitude towards: the self, the technology, the learning experience, and self-efficacy. This project seeks to develop a methodology for focusing a survey on specific behaviors using the virtual world through tight integration with simulated situations.

Participants will be able to explore the self-selection of an identity suited to the challenge at hand, and group dynamics such as planning, collaboration, and cooperation. Participants must choose roles, collaborate on a strategy, and implement tactics to succeed! How does identity affect engagement and motivation? How does participation in a group activity affect a sense of active learning, or yield a new perspective on the self?

Participants will be able to experience first-hand the integration of virtual world behaviors (Second Life) and a learning management system (Moodle). This system is designed to eliminate the coding required for HUD interaction, and make survey data collection much more tightly focused on specific behaviors. This presentation will be a beta test of this new methodology.

**Format:** Virtual World

**Venue:** 3D Virtual Environment

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Host(s):**

Brant Knutzen/MrK Kas (Avatar)

## Get Scrooged Redux - explore A Christmas Carol

Scrooge himself will introduce participants to Dickens' classic Victorian novella: A Christmas Carol! Additional dialogue has been added to some scenes, and for VWBPE 2018 a complete new Stave Five scene has been added to complete the story with a happy ending. Participants will explore the snowy context of the ghost story through nine key scenes, and can click on the characters to hear what they are thinking in each situation.

Participants will be able to experience how the virtual world can present interactive experiential learning to bring the classics of humanities to life! Teleportation between scenes allows participants to jump into new contexts as the journey through Scrooge's nightmare unfolds, and the experience of walking through the 3D audio/visual settings helps to give participants the feeling of life in Victorian times.

**Format:** Virtual World

**Venue:** 3D Virtual Environment

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Host(s):**

Brant Knutzen/MrK Kas (Avatar)

## **The Power of Perspective â€“ a forest adventure**

A lighthearted adventure exploring the Yurei Forest will provide experiential learning about the potential emotional arousal inherent in certain situations, and the variation in valence that different people assign to them.

Note: this simulation is not for the faint of heart!

Participants will be able to explore the Yurei Forest, an experience designed to illustrate the difference between an exocentric viewpoint and an egocentric one. Participants will encounter various situations within a highly unstructured environment which highlight the positive valence associated with group membership, and the wide range of valence that people assign to fight-or-flight scenarios.

**Format:** Wanna Play?

**Venue:** 3D Virtual Environment

**Track:** Collaboration and Distance Connections

**Host(s):**

Chris Luchs/Terroir (Avatar)

Cynthia Calongne/Lyr (Avatar)

Kae Novak/Cytie (Avatar)

Tanya Martin/Gridlock (Avatar)

## **Easter Ethnography Noble Garden Exploration in WoW**

Join us for ethnographic exploration of the Noble Garden Event in World of Warcraft. Participants will select their participant role: complete participant, complete observer, participant-as-observer, and observer-as-participant and collaborate with others to document the culture, interactions, and themes from the experience. Once all data is collected, the group will discuss themes, patterns and categories of interactions and discuss future research opportunities in games.

To introduce participants to the research method of ethnography

Demonstrate how ethnography methods can be applied in games and virtual environments.

**Format:** Wanna Play?

**Venue:** Gaming Platform



**Track:** Creativity and Innovation in Design, Practice, and Learning

**Host(s):**

Johannes1977 Resident (Avatar)

## **WW1: A Centenary of Remembrance**

This experience will showcase key components of WW1 in honor of the centenary of this epic event. Participants will go through a WW1 bunker and learn about life as a soldier in the trenches, revisit the spirit of the UK's Home Guard, and the affects of the aftermath of the war and how the punishments leveled to Germany contributed to WW2.

Participants will be able to describe the components of a WW1 bunker.

Participants will be able to learn ways they can use virtual worlds to teach WW1 concepts.

**Format:** Virtual World

**Venue:** 3D Virtual Environment

**Track:** Creativity and Innovation in Design, Practice, and Learning

**Host(s):**

Valerie Hill/Valibrarian Gregg (Avatar)

Alyse Dunavant-Jones/alyseDunavantJones (Avatar)

Marie Vans/amvans lapis (Avatar)

Robin White-Sieber/Sparkybear Mandelbrot (Avatar)

## **Community Virtual Library Tour: Library Land Exploration**

Participants will visit the Community Virtual Library which has relocated on Cookie Island in Second Life. A real library in a virtual world shares resources, a networking hub, meeting space, campfires, a book orchard and numerous experiences as ways to connect people with virtual world information and communities of interest.

Attendees will have the opportunity to discover innovative digital literacy on a global scale.

Participants will interact with a dynamic virtual library environment exploring purposeful learning.

**Format:** Virtual World

**Venue:** 3D Virtual Environment

**Track:** Ethics, Responsibility, and Tolerance

**Host(s):**

Valerie Hill/Valibrarian Gregg (Avatar)

Marie Vans/amvans lapis (Avatar)

Alyse Dunavant-Jones/Antemeridiem Diskjockey  
(Avatar)

Robin White-Sieber/Sparkybear Mandelbrot (Avatar)

## **Digital Dtitizenship Museum in Kitely Tour**

*Digital Citizenship has become essential for everyone from tiny tots to the elderly, from students to those dealing with national security. This tour shares a Digital Citizenship Museum built by the Community Virtual Library in Kitely.*

Participants will be able to explore elements of digital citizenship for various age groups.

Participants will engage in digital citizenship through an interactive tour at CVL.

**Format:** Virtual World

**Venue:** 3D Virtual Environment

# VWBPE ACKNOWLEDGEMENTS

## Executive Committee

Leticia De Leon  
Kevin Feenan  
Lorraine Mockford

## Organizational Committee

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Hope Botterbusch (sl:Esparanza Freese)		Peer Review
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# AGILE DIMENSIONS





# EXTENDED LEARNING





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