**Topic identification and analysis**
My research aims to explore the use of Digital Games-Based Learning (DGBL) within an art & design-learning environment. The study will focus specifically upon the use of Virtual Reality (VR) simulations and how they support students in developing their art & design practice. Virtual Reality can be described as immersive multimedia: a computer technology that simulates a user’s presence in a real or imagined environment through a rendered stereoscopic 3D image.

**What is my specific research question?**
‘How can Virtual Reality simulations support learning within a Fine Art Undergraduate learning environment?’

**What is my study trying to achieve and why?**
As a teacher of digital media arts facilitating the technical realisation of student projects at Central Saint Martins, my study aims to explore how digital technologies can be used to engage and motivate students, and assist them in developing their art & design practice.

With digital technologies now ubiquitous, particularly the proliferation of smart phone use, it seems that almost all of us are engaging with computers. My observations whilst commuting regularly include large numbers of people playing digital games on mobile devices. Often these games are for entertainment and a way to pass time yet I have noticed that there has been an increasing trend in games for educational and training purposes. These experiences led me to further consider the use of digital games for non-leisure purposes such as training and support, and how digital games may be employed within our university environment for learning & teaching and continuing professional development.

Virtual Reality has recently emerged onto the consumer market with ever-increasing accessibility via mobile devices. I have witnessed considerable engagement with the technology by both staff and students at University of the Arts London, and with these considerations I feel it to be a topical and exciting research subject. I hope to explore and establish how virtual reality simulations can be integrated into the curriculum, and how the simulations and activities can be useful to both students and teachers in supporting learning & teaching. I hope that the outcomes of the study could be useful to teachers, students and professionals alike as a way of developing art & design practice, with the specific learning aim of encouraging and motivating concept identification and development.

My research study will be part practice-based and I propose to develop a working VR simulation to support Fine Art Undergraduate learning & teaching. Before commencing the practice-based element of my submission, I shall present a review of the literature surrounding DGBL and VR simulations, providing a review of the ways in which DGBL and VR are being considered in the framework of education. I propose to develop my research study with Fine Art Undergraduate students and teachers, who are the core users of my workplace, the digital media suite at CSM Archway.

**Annotated bibliography**
Through tutor and peer discussion, I compiled the following annotated bibliography to start my research study and help focus it’s aims. Another annotated bibliography (appendix I) focuses specifically on DGBL in order to provide a foundation for the following annotated bibliography focusing specifically of VR simulations. Although not discarded, the first annotated bibliography provided a foundation and provided greater focuses for my chosen theme of VR in education.
This paper analyses the use of immersive interfaces for engagement and learning. The article examines the participant’s suspension of belief that they are “inside” a digitally enhanced setting. The paper examines how the immersion in a digital environment enhances education in at least three ways: by allowing situated learning, multiple perspectives and transfer. This study is particularly useful for my own research as provides a perspective that acts as an introduction to VR in education, and discusses some of its benefits and limitations. The limitation is that it is an article, as opposed to a study, and compares the results of other research projects. The advantage could be that it allows for recommendation of further texts that may be of interest. This article forms the foundations of my research through exploration of knowledge transfer, specifically.


   This article lists examples of research that use virtual reality in education and training. It demonstrates advantages and disadvantages of using virtual reality, as well as suggestion on when and when not to use virtual reality in education. The paper also presents a model that can be employed in determining whether using virtual reality in education and training is suitable and why. This book is useful to my research as it focuses directly upon my chosen area of research: VR in education. Limitations of this text could be that its context doesn’t focuses specifically or solely on art & design education. The text also points to Pantelidis’ extensive bibliography of over 800 printed resources, such as articles and reports, that discuss virtual reality in education and training, which should prove useful as a resource for information for my dissertation.


   In this paper Mantovani & Castelnuovo explore an outline of a possible model of presence in virtual learning environments. The authors try to define the key factors conveying it in training contexts and also how the sense of presence contributes to enhancing learning efficacy and supporting the transfer of knowledge and skills. Their research investigates the learning of “soft skills” of strategic interests to enterprise such as leadership, customer services, coaching, selling, etc. The article is useful to my research topic, as Mantovani & Castelnuovo explore the understanding of outcomes and their motivational impacts. The main limitation of this paper is that it was written in 2003 and may therefore offer a limited opinion that has since progressed.


   In this article, Moreno & Mayer explore what interactive multimodal learning environments actually are and how they should be designed to promote students’ learning. The authors offer theory pertaining to cognitive-affective learning with media from which the principles of instructional design are derived. Their research then reviews a series of experimental studies. They found empirical support for five design principles: guided activity, reflection, feedback, pre-training and control, which are elements in line with the concerns of my own study. The main limitation of the article is that it is not focused entirely art and design education but provides a solid foundation for my study, particularly the elements exploring feedback and reflection. I feel that this article will form the basis of my research study as it also offers directions for future instructional technology research.


   In this study Wallach et al. review the effects of Virtual Reality Cognitive Behaviour Therapy (VRCBT) with regards to public speaking. The study was conducted to assess the effectiveness of VRCBT as an alternative to Cognitive Behavioural Therapy (CBT). The results of the paper suggest that VRCBT can be more effective than CBT in terms of participants completing the
course of therapy. This paper is useful to my research topic as many students express anxiety in relation to presenting their work in critiques and I feel that it may be useful to explore this area of research in more detail in my study. The main limitation of the article is that it looks at public speaking in general, as opposed to a specific scenario such as art and design education. The article will not form the basis of my research but will inform its development due to the problem that it address and its application to art and design educational scenarios.


This article examines the new possibilities that VR presents, with particular regards to train individuals to perform physical movements such as exercise and physical therapy. The author investigates to aspects that contribute to the media interactivity: the ability to capture and review physical behaviour and the ability to view a person’s avatar from a third-person perspective. Their research explores why DGBL is engaging and effective, and how games can be integrated into the learning environment. The study suggests that people learn better in VR. Limitations to the paper could be that it focuses on exercise and physical therapy, yet I felt this could be useful when considering the use of tools and / or physical process such as model making, woodworking etc. I feel that this article may not form much basis for argument in my own paper but may provide insight into how these functions could be translated into an art and design-learning environment.

**Integrating Summary**

My initial intention for the MA dissertation was to explore the use of DGBL within an art & design Higher Education environment, placing particular emphasis on student’s self-reflection upon their art & design practice. I chose this research subject as through my teaching practice I had discovered that this was a process that many students seemed to struggle with, and was an area of interest that I had already started to explore. Prior to this Research Methods in Education (RME) unit I completed a 40-credit Negotiated Studies project exploring the theme, developing reflective discourse through engagement with digital tools. The project was initially a pilot study consisting of four participants, with the prospect of developing it further and increasing sample groups at a later date. Having considered the results of the project and the outcomes and responses of the participating students, it had proven to be an interesting project that could be expanded and had also developed my interest and understanding of DGBL.

Through creating a mind map exploring my research topic during the classroom days of the RME unit (appendix II), I felt that I was essentially attempting the same project with an action research methodology. Although potentially suitable, I felt that there was much more to explore so continuing with this research thread and exploring further academic papers, I honed my interests to focus specifically on Virtual Reality as it is an emerging and accessible platform that will seemingly soon become commonplace at consumer level, and is already being used for professional training purposes in a variety of settings. Through this extended reading, comparative scoping studies (appendix III) and a face-face tutorial, I also realised that reflection upon practice was not my clear anchor as a learning aim and that VR could potentially be used in a more holistic approach to learning & teaching. These experiences led me to create a second mind map (appendix IV) that would allow me to further hone my research study.

With consideration of having to produce a VR simulation to suffice the practice-based element of my study, I started to look at points of departure for consumer VR. The points of departure were Google Cardboard, Samsung VR, Oculus Rift and HTC Vive. Google Cardboard (2014) is the simplest of the devices. It is a low-tech virtual reality head mounted display (HMD) constructed of precision-cut cardboard with two 45mm focal length aspherical lenses, with the device held together with Velcro and an elastic band. Users can either make their own using readily available instructions or buy the complete kit ready for construction for £15 direct from Google (I managed to find a complete kit available from China for less than £2 on eBay). Once constructed the user can download a variety of apps for their mobile device, then slot their smartphone into the
A cardboard device to act as both screen and driving computer that allows the consumer to experience a rudimentary VR experience by holding the device to their eyes. Google have also made available the Software Development Kit (SDK) for developers to make content for Google Cardboard on the Apple iOS and Google Android mobile operating systems.

Samsung VR could be considered the next accessible consumer VR system with a similar ethos to Google Cardboard. Announced in September 2014 and released on the consumer market in the last quarter of 2015, the adjustable HMD is more advanced and comfortable than Google Cardboard as it is made of plastic and includes an adjustable head strap. It also allows user to wear their spectacles if required and also allows for some interaction via buttons on the HMD. The technology was developed and released by Samsung Electronics in collaboration with the Oculus Company. Oculus Rift is a more advanced VR head mounted display that was released on the consumer market in 2016, having been funded for development through the crowd-funding site Kickstarter.com in 2012. Originally raising US$2.5 million for development, the company behind the platform Oculus, was later sold to Facebook for US$2 billion in March 2015, indicating huge scope for consumer dissemination. The HTC Vive is currently the most advanced VR system available on the consumer market, developed by HTC and Valve Corporation. The technology was announced in March 2015 and released on the consumer market in April 2016. It is designed to utilise ‘room scale’ technology that employs sensors to turn a physical space into a virtual environment that users can physically navigate. The HTC Vive also incorporates two hand-held controllers that allow the user to interact with the simulated environment, that include functions including haptic feedback.

I recently attended an afternoon workshop at CSM with Sion Fletcher, Creative Code Specialist Technician, and experienced the HTC Vive running The Lab app. Sion also gave a coding tutorial using Unity 5.2.2. Unity has been recommended as my app development point of departure, due to its accessibility for beginners through online tutorials. Other popular engines for developing VR applications include Valve Open VR and Unreal Engine 4 Render. Looking forward with consideration of what my VR simulation may address, I am currently focusing upon the process of concept, development, outcome within art & design education, and how this may be disseminated and taught to students using virtual reality technology. Part of my research plan will be to search for papers discussing the concept of concept, development, outcome and how it is taught. I have also considered interviewing professional art & design practitioners about their own practice, as the concept is widely adopted in professional practice and not left behind at art school upon graduation.
Research proposal

“How can Virtual Reality simulations support learning within a Fine Art Undergraduate learning environment?”

Introduction and background to the topic in brief

As a teacher of digital media arts facilitating the technical realisation of student projects at Central Saint Martins, my study aims to explore how digital technologies can be used to engage and motivate students, and assist them in developing their art & design practice.

With digital technologies now ubiquitous, particularly the proliferation of smart phones, it seems that almost all of us are engaging with computers. My observations whilst commuting regularly include large numbers of people playing digital games on mobile devices. Often these games are for entertainment and a way to pass time yet I have noticed that there has been an increasing trend in games for educational and training purposes. These experiences led me to further consider the use of digital games for non-leisure purposes such as training and support, and how digital games may be employed within our university environment for learning & teaching and continuing professional development.

Virtual Reality has recently emerged onto the consumer market with ever-increasing accessibility via mobile devices. I have witnessed considerable engagement with the technology by both staff and students at University of the Arts London, and with these considerations I feel it to be a topical and exciting research subject. My study aims at utilising virtual reality for learning purposes within art & design education and aims to support students through the process of concept, development and outcome. My study will be part practice-based with a virtual reality simulation contributing towards the final submission.

Literature review leading to my research question

Many papers assert the previous limitations of virtual reality being too expensive to explore. Yet due to the emergence of the technology on the consumer platform, I feel that this notion may now be omitted.

Dede’s 2009 article Immersive Interfaces for Engagement and Learning states that ‘immersive interfaces can foster educational experiences that draw on a powerful pedagogy: situated learning’ (p66). He continues that total sensory interfaces (immersive simulations that incorporate haptic feedback) can also enforce learning. Potential simulations of real-world environments such as wood or metalworking and associated tools and processes could be simulated in VR (using a saw with haptic feedback, for example), allowing the VR learning to be applied to real world experiences, therefore increasing educational achievements whilst minimizing risk.

Pantelidis’ paper (2009) provides a model as to when it may or may not be suitable to simulate a process using VR (appendix V). In the article, Pantelidis refers to Winn’s (1993) prior list suggesting when to use VR in education, stating ‘constructivism provides the best theory on which to develop educational applications of VR’ (p61), enforcing constructivism as a successful learning method that I must explore further. Pantelidis states that ‘virtual reality motivates students … requires interaction and encourages active participation rather than passivity’ (p62) and that ‘virtual reality allows the learner to proceed through an experience … at their own pace’ (p62). Pantelidis states that ‘one major advantage of using virtual reality to teach objectives is that it is highly motivating’ and refers to Mikropoulos et al.’s (1980) finding of ‘a favourable attitude towards virtual reality in the educational process’. Pantelidis states that ‘VR grabs and holds the attention of students. This has been documented in the reports of a number of research studies.’ (p63). She asserts that ‘VR requires interaction, changing the way the learner interacts with subject matter … encouraging further interaction due to seeing immediate results (p63).

Mantovani & Castelnuovo also cite Winn (1993) and further assert that ‘virtual reality can be a useful tool for evaluation and assessment, since every training session … can be monitored
and recorded by trainers’ (p168). Mantovani & Castelnuovo also refer to constructivism and enforce that a sense of presence in a VR simulation can dramatically improve learning outcome. They also suggest the benefit of making mistakes in VR, as they have no real world effect yet allow a protected environment for learning. They also assert that simulations may help emotion and stress management, and support learning with regards to anxiety in social situations (for example in critiques and presentations). ‘All of these actions enhance a sense of presence and allow a transfer of knowledge from the virtual context to the real one’ (p172). Mantovani & Castelnuovo go on to discuss the act of meta-reflection: ‘a break in presence in order to reflect on the actions recently made’ (p178), suggesting that VR simulations must embed time for reflection during the simulation in order to gain maximum benefit of learning outcome.

Moreno & Mayer (2007) discuss interactive multimodal learning environments (combining verbal and non-verbal modes to represent the content knowledge) and assert that interactive multimodal learning environments should adapt in reaction to the learner’s actions, allowing a ‘two-way action (between learner and instructor) as opposed to a one-way (i.e. from instructor to learner)’ (p311). In terms of VR, this could equate to the learner asking a question and receiving an answer or giving an answer and receiving feedback, or clicking on a hyperlink to access further information. This allows the learner to engage with deep learning and also control the pace of the simulation. Moreno & Mayer discuss their (2003) cognitive-affective theory of learning with media (CATLM) and how it is applicable to VR – this must be further explored where word-count allows. The list of references for this paper provides greater scope for understanding multimodal learning environments.

Wallach, Safir & Bar-Zvi discuss VRCBT further through a randomized clinical trial focusing on public speaking anxiety. Discourse and presentation of work is integral to art and design education, and is an area that many students report learning conflicts due to their anxieties. The research conducted by Wallach, Safir & Bar-Zvi suggests that VRCBT is effective towards supporting public speaking anxiety and has encouraged me to consider this further as a learning support tool suitable for simulation to support student discourse of their art practice. Slater et al. also conducted experiments with regards to public speaking anxiety and report encouraging findings in its effectiveness, allowing further confidence in exploring this topic. Social interaction and VR is explored in-depth in many papers and although pertains more to the study of psychology, I feel that it is incredibly important in the context of my research topic as it allows another springboard from which support for students may be offered via an immersive virtual environment.

Further reading
Pantelidis’ 2009 paper recommends McLellan’s The Handbook of Research for Education Communications and Technology (1996, 2003). McLellan provides comprehensive and in-depth literature reviews related to the use and research of virtual reality for education and training, and traces the history of VR to flight simulators in the 1960’s and 1970’s. Pantelidis refers to Youngblut’s (1998) extensive research into virtual reality and its educational uses, and this should also be reviewed. Pantelidis also refers to Chen’s 2006 research that ‘resulted in insights into a feasible instructional design framework, as well as an instructional development framework for VR-based learning environments’ (Chen 2006, p39). These appear to be key texts for my progression.

Methodology, Rationale & Methods
My study aims to provide a part practice-based project underpinned by theoretical placement. My overarching aim is to review the technologies and relevant literature currently available on VR in the arts and education, before moving on to the technical realisation of a VR simulation that supports learning & teaching, thereby presenting a mix of theory (in the form of a literature review) and practical knowhow (a subsequent VR simulation as practice-based research) conjoined as the final dissertation outcome.
Once I have pinned my study theoretically, my aim is to be in a position where I could build a VR simulation from an informed perspective. At this stage I feel that the practice-based element will incorporate an action research methodology, as the simulation will have to go through several rounds of testing and redevelopment, preferably with a pilot group of students. At this stage, I feel that it would be of benefit to take a mixed sample of students from all stages of undergraduate study to obtain broader feedback, as opposed to targeting Stage 1 students over Stage 3 students, for example. I feel that tutors will also be involved in the testing of the simulation(s) and various redevelopment phases. The action research element will have some ethical considerations, therefore the staff and student participants will be provided with appropriate information about the purpose, methods and intended uses of the research (public dissemination), what their participation in the research entails and the risks and benefits that may be involved. This would require a participation agreement (to be developed at a suitable point within the project) that considers participant and group preferences regarding anonymity (if appropriate) and / or the dissemination of the participant’s information, personal data and contributions.

My methods consider methods of building the simulation with creative coding. The currently leading engines used to create VR content include Unreal, Unity and Steam. Unity currently has a lot of interest focused on it as a development platform and provides many tutorials and videos to help developers get started. The Unity editor also provides users with a bank of predicted commands, which will assist me greatly as a beginner VR developer. I therefore feel that Unity would be the best engine to enact my project of creating a simulation to support the learning & teaching of my Fine Art undergraduate student's. ‘Google provides developers with two virtual reality (VR) platforms: Cardboard, the world’s most popular and accessible mobile VR platform, and Daydream, a new platform for low-latency, immersive, and interactive mobile VR’<https://developers.google.com/vr/> (Accessed August 19 2016), therefore my point of departure for VR development will use the Google Cardboard SDK, as it is designed specifically for entry-level development and is the more accessible of the two platforms. Google suggest initially working with the demo app Treasure Hunt to learn the basic calls to CardboardActivity and other functions (binocular rendering, spatial audio, head tracking movement and trigger input). Treasure Hunt is a basic game that demonstrates the core features of Google’s VR SDK. When sufficient success and understanding is achieved, I plan to move on to more advanced systems.

Although my early research focused upon DGBL, my literature review led me to decide upon a simulation as opposed to game, using a virtual reality environment to immerse the participant in a problem and provide them with immediate feedback on their experience. I aim to design a simulation that addresses a particular learning aim (or aims) to anchor my project within art & design pedagogy. The anchor will focus upon the 3 stage framework of the concept, development and outcome process employed in art & design education, with the students engaging with technology and then engaging with their personal work. Key factors for the simulation are that it is hands-on, immediate and improves critical thinking, self-awareness, and motivation for students to develop their work. I feel that VR is a good research subject due to its current emergence and accessibility at consumer level.

**Proposed research plan**
My proposed research plan contains a number of elements:
- Compile a vocabulary list (listicle) for dissemination / publication.
- Read up on the industry and review what is currently available. Products for review include Google Cardboard, Riem3 Plus, Oculus Rift, HTC Vive, PlayStation VR, Samsung VR, Microsoft HoloLens, FOVE, Zeiss VR One, Project Apollo and Morpheus. Learn about the different headsets and discover what the differences are between each of the headsets. How are their specifications different? What are their current capabilities and limitations?
- Read up on academic journals, with specific focus on VR in the arts / education.
- Test consumer headsets and apps as an introduction to VR.
- Explore gamepads and interactivity with VR – although some of the headsets employ gyroscopic technology for the computer to recognise where the user is looking, FOVE is the only
device that currently uses eye-tracking software. HTC Vive has included dexterous interaction, as has the new Intel that digitizes real-life objects and merges them with the virtual reality experience. Some current devices use gamepads for interacting with the systems and this should be explored.

- Learn about creating immersive content using the Cardboard Camera app that takes VR photos and Nokia’s Ozo VR-dedicated professional camera.
- Learn about computer hardware required for VR development and propose a workstation.
- Learn about different engines used to create VR apps such as Unreal, Unity and Steam.
- Build some simple VR apps using the Google SDKs (and potentially other VR engines) in order to better understand the platform.
- Go to VR meet-ups to talk to other developers, internal and external to UAL. UAL recently invited funding bids for Communities of Practice. Realising the potential for VR in the Arts, I proposed The Virtual Reality Interest and Research Group and was successful in my bid. Another group within the university proposed a VR Arts group, with UAL advising that we conjoin as one community and awarded funding for both funding bids, to be used by the conjoined community. The Community of Practice aims to interact regularly in order to demonstrate and disseminate expertise and experience of Virtual Reality to promote the tech platform across a range of subject disciplines. The group aims to be a platform for discussing the creative and cultural implications of the digital medium. I hope to discuss my research project and its development in this supported environment of the Community of Practice. External events include a planned trip to Copenhagen in September 2016 where I will visit Khora, the virtual reality store and hub for innovators. It is described as ‘a place to learn about the technology with the aim of expanding its potential.’

Bibliography


Appendix I – Annotated Bibliography


This paper analyses the number of journal-published articles researching DGBL. The study examined the research trends of this topic via the number of DGBL articles published in seven major technology-based learning journals from 2001 to 2010. Their research aimed to identify an increase / decrease in the number of articles concerning the topic, the types of research sample groups and the research learning domains relating to DGBL. This study is particularly useful for my own research as it suggests numerous papers of interest. The limitation of the article is that it is not art-specific and considers other disciplines including science and engineering. I am encouraged by their findings reporting a four-fold increase in research in this area in the latter five years (2006-2010) compared to the previous five years of the decade in question, ‘implying that the studies in this field has become more and more important in the last decade’ (Hwang & Wu, 2012), thus suggesting my study is worthwhile. This article forms the foundations of my research through exploration of the cited texts.


Prensky’s book traces the shift from traditional learning techniques to digital and game-based learning methods. It demonstrates how learners have changed, how game-based learning actually works, its current and future applications, as well as looking at the role of educators and trainers in this new and exciting arena. The book defines digital game-based learning, explains it advantages and benefits far into the future, where it can be used and how. This book is useful to my research as it focuses directly upon my chosen area of research into digital game-based learning and mentions VR. Limitations of this text could be that its context appears to be focused more upon business as opposed to education, yet the author’s approach, observations and evaluations should prove valuable to my own research.

• Connolly, T., Boyle, A., MacArthur, E., Hainey, T., Boyle J. 2012. “A systematic literature review of empirical evidence on computer games and serious games”. In this article Connolly et al. review literature pertaining to empirical evidence on computer games and serious games and their potential positive impacts, especially with respects to training. The authors identified 129 papers reporting the topic and the development of a multidimensional approach to categorizing games. Their research found that DGBL is linked to a variety of impacts and outcomes, including perceptual, cognitive and behavioural. The article is useful to my research topic, as Connolly et al. report positive content understanding outcomes and motivational impacts. The main limitations of this research is focus being placed on the impact of gaming on users over 14, therefore not fulfilling my desired demographic, yet the authors provide a wealth of information that may pertain useful to my particular research focus and may form foundations for my research.


In this article, Lean et al. explore the use of games and simulations in tertiary education and examines how academics employ simulation-based learning approaches and how they perceive the barriers of such techniques. The authors use data gained through a survey of academic staff working across a range of subject disciplines, conducted in 2005. Their research focuses on the perceived barriers of employing such techniques in HE. The article is useful to my research topic as Lean et al construct a typology of simulation types. The main limitation of the article is that it is not entirely focused upon DGBL, and includes other modes of simulation, yet it does include recommendations for improved practice. This article will not form the basis of my research; however, it will supply supplementary information for my research on games based learning and particularly simulations.

In this study LaFrance & Blizzard review the regards of students’ perceptions of digital storytelling as a learning tool. The study was conducted with 12 students participating in an Administrative Theory course as part of their doctoral program in K-12 or higher education administration at a Carnegie Doctoral Research University in Georgia. The purpose of this non-experimental qualitative study was to examine student’s perceptions of utilising digital storytelling in educational leadership coursework. This paper is useful to my research topic as LaFrance & Blizzard explore reflective thinking skills in students using digital facilities. The main limitation of the article is that it is aimed at K12 US education as opposed to HE Art & Design learning in the UK, yet their approach may inform and inspire my individual approach. The article will not form the basis of my research but will inform its outcomes.


This article examines the widespread public interest in games as learning tools. The author proposes that games have now become effective, and potentially essential in learning environments. Their research explores why DGBL is engaging and effective, and how games can be integrated into the learning environment. This paper appears extremely useful to my own research as it explores the effectiveness of digital games specifically within learning environments. Limitations to the paper could be that it was published in 2006 and technologies and opinions have progressed exponentially in the last decade, yet the fundamentals of the research objectives appear to be equal to that of my own research. I feel that this article may form much basis for argument in my own paper.
Appendix III – Scoping Studies

RME, Scoping study 1

What is the proposed research study about?

As a teacher of creative digital software at CSM and a facilitator of the technical realisation of student projects, I hope to explore ways that digital technologies can be used to develop student art & design practice.

My aim is to explore the use of Digital Games-Based Learning (DGBL) within an art & design learning environment, placing particular emphasis on student reflection upon their practice.

What is your specific research question?

‘How can simulation games deepen, motivate and accelerate learning within an art & design learning environment?’

What is your study trying to achieve and why?

With digital technologies now ubiquitous, particularly with the rise in smart phone use, it seems that almost all of us are engaging with computers. My observations on my morning commute regularly include a large number of people playing digital games on mobile devices. Often, these games are merely for entertainment and a way to pass time but I have noticed that there has been an increasing trend in games for educational and training purposes.

These experiences led me to further consider the use of games for non-leisure purposes, such as training and support, and how digital games may be employed within our university environment for learning, teaching and continuing professional development.

What will you and others learn from the outcomes of your study?

I hope to explore and establish how digital games can be integrated into the curriculum, and how the games and activities can be useful to both students and teachers in encouraging and developing discourse of concept development and reflection upon art and design self-practice.

Who would find your outcomes of value and why?

I feel that the outcomes of the study could be useful to both educationalists and students as a way of engaging with and developing art & design practice, both within and outside of UAL, and other art and design professionals and students.

How will you go about carrying out the research study? What will you do, when and to or with whom?

By inviting the students using the digital media facility at the Archway campus at CSM to participate in gaming activities to develop their project concepts, I hope to build a case study that describes their personal experiences using DGBL. Through using a variety of game types, from role playing games through to puzzle games, I hope to document their responses via one-one interviews and to compare and contrast the effectiveness of the tasks and game types to determine an effective curriculum intervention. The interviews will allow me to collect a description of their experiences for later analysis.

RME, Scoping study 2

What is the proposed research study about?

As a teacher of creative digital software at CSM and a facilitator of the technical realisation of student projects, I hope to explore ways that digital technologies can be used to develop student art & design practice.
My aim is to explore the use of Digital Games-Based Learning (DGBL) within an art & design learning environment, placing particular emphasis on student reflection upon their practice.

**What is your specific research question?**

‘How can digital games be employed as learning & teaching tools within an art & design environment, with the aim of developing students reflective discourse?’

**What is your study trying to achieve and why?**

With digital technologies now ubiquitous, particularly with the rise in smart phone use, it seems that almost all of us are engaging with computers. My observations on my morning commute regularly include a large number of people playing digital games on mobile devices. Often, these games are merely for entertainment and a way to pass time but I have noticed that there has been an increasing trend in games for educational and training purposes.

These experiences led me to further consider the use of games for non-leisure purposes, such as training and support, and how digital games may be employed within our university environment for learning, teaching and continuing professional development.

**What will you and others learn from the outcomes of your study?**

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**Who would find your outcomes of value and why?**

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**How will you go about carrying out the research study? What will you do, when and to or with whom?**

Prompted by my previous negotiated studies, I feel that action research would be an appropriate methodology due to the cyclical nature of redesigning the activity with consideration of student responses and my previous findings. My original project explored the concept of Lego Serious Play (a concept developed for the corporate sector that encourages users to explore topics via play) and investigating whether the concept could be translated to a digital experience using the game Minecraft (a popular sandbox game where players create objects/environments using digital blocks within a three dimensional digital world). The project’s aim was to facilitate and deepen student reflection on their art and design practice using a digital game.

By redesigning the inquiry and data collection methods to include anonymous questionnaires, I hope to observe, reflect and react to the student’s responses and redevelop the tasks until the intervention is comprehensive to attach to the curriculum.
Appendix IV – Mind Map II
Figure 1. Model for determining when to use virtual reality in education and training courses. Copyright 1997, 2009 by Veronica Sexauer Pantelidis.