

Game-Based Learning: Challenges and Opportunities

Game-Based Learning:
Challenges and Opportunities

Edited by

Patrick Felicia

CAMBRIDGE
SCHOLARS

P U B L I S H I N G

Game-Based Learning: Challenges and Opportunities,
Edited by Patrick Felicia

This book first published 2014

Cambridge Scholars Publishing

12 Back Chapman Street, Newcastle upon Tyne, NE6 2XX, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Copyright © 2014 by Patrick Felicia and contributors

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

ISBN (10): 1-4438-5345-3, ISBN (13): 978-1-4438-5345-3

This book is dedicated to my lovely wife Helena.

TABLE OF CONTENTS

List of Illustrations	ix
List of Tables	xi
Preface	xii
Acknowledgement	xiii
Chapter One.....	1
Blending Narrative, Play and Learning: An Examination of Alternate Reality Games as a Game-Based Learning Tool Ronan Lynch, Bride Mallon and Kieran Nolan	
Chapter Two	29
Composing Game-based Learning Scenarios by Connecting Instructional Design Patterns Dennis Maciuszek, Martina Weicht and Alke Martens	
Chapter Three	55
Gesture-based Computing in the Mathematics Classroom Alison Mc Namara and Catherine Paolucci	
Chapter Four.....	77
Assessing Eye-Tracking Technology for Learning-Style Detection in Adaptive Game-Based Learning Tracey Mehigan and Ian Pitt	
Chapter Five	112
Promoting Relaxation through Gameplay Mary Mollaghan	
Chapter Six	143
Poetic Machines: The Essentiality of the Human and the Machine in Digital Creative Expression Jeneen Naji	

Chapter Seven.....	165
Representations of Self in a Classroom Virtual World: A Case-study of Pupils on the Autism Spectrum Nigel Newbutt	
Chapter Eight.....	193
Effects of a Therapeutic Exergame for Rehabilitation Sarah O’Neill and Patrick Felicia	
Chapter Nine.....	237
Serious Games in Higher Education: What do our “Digital Natives” Really Think? Pauline Rooney	
Contributors.....	261
Index.....	267

LIST OF ILLUSTRATIONS

Figure 1.1: ARG Game Features	5
Figure 1.2: The ARG World Model	6
Figure 1.3: The ARG World Model Components & Sub-Sections	7
Figure 1.4: Seven Pedagogic Benefits of ARGs (Moseley, 2008).....	12
Figure 1.5: Framing the Content Analysis Process.....	14
Figure 1.6: Detailing the Content Analysis Rules	15
Figure 1.7: Content Analysis Reduction.....	16
Figure 1.8: Summary of Evaluation Criteria	25
Figure 2.1: Interconnection of content design patterns.....	41
Figure 2.2: Crafting in virtual labs: <i>manipulate; observe; manipulate</i>	42
Figure 2.3: Crafting in virtual factories: <i>manipulate; observe; manipulate</i>	42
Figure 2.4: Quest pattern Whodunit	43
Figure 2.5: Conversation in a virtual theatre: <i>ask; read answer; write; ask</i>	43
Figure 3.1: Geogebra.....	58
Figure 3.2: Box 1, A Conceptual Framework for Digital Competence (European Council, 2012)	66
Figure 3.3: Dartboard and Dart Developed Using 3DS Max.....	67
Figure 3.4: Findings Chart	69
Figure 4.1: FSILS Example Results Screen	84
Figure 4.2: a) Global Learner Heat Map, b) Sequential Learner Heat Map.....	94
Figure 4.3: a) Global Learner Gaze Plot, b) Sequential Learner Gaze Plot.....	95
Figure 4.4: Visual Learner Gaze Plot, b) Verbal Learner Gaze Plot	98
Figure 4.5: Visual Learner Gaze Plot, b) Verbal Learner Heat Map	98
Figure 4.6: The MAPLE Model	100
Figure 4.7: MAPLE-based Prototype - Potential Eye-Tracking Interaction on Learner Assessment Screen.....	104
Figure 5.1: The forest section of the game	123
Figure 5.2: The dolphins appearing in the game.	124
Figure 5.3: Showing the sequence of the experiment.	126
Figure 5.4: Comparison of mean pulse.....	127
Figure 5.5: Comparative changes in BP.....	129
Figure 5.6: Comparison of Tension and Relaxation Scale ratings.....	130
Figure 5.7: Comparative changes in the PANAS.	132
Figure 5.8: Comparative changes in the Alert, Active and Excited ratings	134
Figure 6.1: if Poem.....	148
Figure 6.2: Fallow	153
Figure 6.3: The Dead.....	155
Figure 7.1: Properties of the default avatar in Second Life	176
Figure 7.2: Example of Sophie's avatar in Second Life. Notice the hairstyle and design	183

Figure 8.1: Main Menu Screens	214
Figure 8.2: Instruction Screens.....	214
Figure 8.3: Bubble Burst Game.....	215
Figure 8.4: Shooting Gallery Game.....	216
Figure 8.5: Solar Flight Game	216
Figure 8.6: Participant SDI Scores bar chart	219
Figure 9.1: Serious Gordon	243
Figure 9.2: Age profile of participants	246

LIST OF TABLES

Table 2.1: Quest pattern	40
Table 2.2: Item pattern	41
Table 4.1: A General Comparison between Traditional Learning and Technology Enhanced Learning (adapted from ISTE, 1998).....	79
Table 4.2: Dimensions of the FSLSM.....	83
Table 4.3: FSILS Dimensions Scores Definitions	84
Table 4.4: Combined Eye-Tracking Study Participant Frequency Distribution	92
Table 5.1: Mean pulse before and after game play.....	127
Table 5.2: Mean BP before and after game play.	128
Table 5.3: Mean BP before and after game play.	130
Table 5.4: PANAS mean ratings.	131
Table 5.5: Mean of Alert, Active and Excited ratings.	133
Table 5.6: Summary of Findings.....	135
Table 7.1: The Social Communication Questionnaire results.....	172
Table 7.2: Overview of the characteristics of the typically developing group.....	173
Table 7.3: Summary of 3D avatars created by the ASC group, represented both visually and through description; only a selection are included.....	177
Table 7.4: Images and descriptions of the TD group's avatar customization; only a selection	179
Table 7.5: Number of changes, time taken and total score for the entire ASC group with eight from the TD group. Mean changes and score also included (with percentage of deviation from base-avatar).....	184
Table 8.1: Demographics of participants.....	208
Table 8.2: Exercises incorporated into the game environment.....	211
Table 8.3: Behaviours and Game Elements for Development.....	213
Table 8.4: Participant SDI Scores	218
Table 8.5: Participant's Intrinsic Motivation Score	221
Table 8.6: Participant's Identified Regulation Scores	221
Table 8.7: Participant's External Regulation Scores.....	222
Table 8.8: Participant's Amotivation Scores.....	223
Table 8.9: Additional questions for Traditional Physiotherapy.....	223
Table 8.10: Additional questions for Game Developed.....	224
Table 8.11: Results of additional questions for data collection	224
Table 8.12: Participant's Exercise Technique Accuracy	226

PREFACE

Game-Based Learning is gaining a wider recognition amongst practitioners and in the industry, as research in this field is consistently showing how this medium can be successfully used to improve both learning and motivation.

This book is an invitation to delve into the world of Game-Based Learning, to understand the many facets that make games a truly interesting and effective tool to teach and train in the 21st century. It includes nine chapters whose content was initially presented at the iGBL conference, a conference held throughout Ireland, where researchers, practitioners, students and other stakeholders meet and share their interest in games and education. These chapters touch on some very important topics including games for health, formal education, poetry and games, science teaching through mobile games, relaxation with gaming devices, and accounting for disabilities with handheld devices. Together, these chapters illustrate the advancements in the field of Game-Based Learning, the challenges faced by developers and educators, as well as the opportunities that this medium can offer.

Each chapter is written with practicality in mind in an effort to provide the reader with both a solid theoretical approach and background, coupled to some practical guidelines and suggestions that can be applied easily.

I hope you enjoy this book and that it motivates you to tap into the many possibilities offered by games to instruct, motivate, and lead change.

Dr. Patrick Felicia.

ACKNOWLEDGEMENTS

I would like to thank all the authors for their excellent work as well as the reviewers for their invaluable feedback. Their thorough suggestions have significantly helped to strengthen the content of this book.

The reviewers for this book were as follows:

- Jodi Asbell Clark, TERC, United States of America
- Lorraine Boran, Dublin College University, Ireland
- Linda Breitlauch, University of Applied Sciences of Düsseldorf, Germany
- Aaron Chia-Yuan Hung, University of Washington
- Yam Sam Chee, national Institute of Education, Singapore
- Penny DeByl, Bond University, Australia
- Jacob Einfield, California State University Northridge, United States of America
- Allan Fowler, Waiariki Institute of Technology, New Zealand
- Stefan Stefan Göbel, Technische Universität Darmstadt, Germany
- Crystle Martin, University of California Irvine, United States of America
- Lisi Gopin Geffen, Lifelong Learner, United States of America
- Jessica Hammer, Columbia University, United States of America
- Joannes Konert, Technische Universität Darmstadt, Germany
- Hannah Marston, German Sport University of Cologne, Germany
- Andreea Molnar, Brunel University, United Kingdom
- Kimberly Voll, GNW Trust, Canada
- Foo Check Yang, Temasek Polytechnic, Singapore

CHAPTER ONE

BLENDING NARRATIVE,
PLAY AND LEARNING:
AN EXAMINATION OF ALTERNATE REALITY
GAMES AS A GAME-BASED LEARNING TOOL

RONAN LYNCH, BRIDE MALLON
AND KIERAN NOLAN

Abstract

The increasing application of digital games and technologies into learning environments has impacted both on how educators teach, and students learn. This change has paved the way for the adoption of Game-Based Learning (GBL) tools. This section details *Alternate Reality Games (ARGs)*, as one such GBL tool.

ARGs are cross media narrative-based games that use the Internet as a central communications platform. The interactions of participants drive the progression and direction of the story and play experience. Boundaries between reality and fiction are disguised, as game designers ensure that characters and scenarios react dynamically to player input. Working collaboratively, players collate a fragmented narrative by deciphering codes and clues.

The application of ARGs as a pedagogic teaching tool is still relatively new. The two-way dynamics of Serious ARG game play allows players and educators to interact in a learning environment where players construct interpretation and meaning.

This section presents a framework, illustrating the components of an ARG. A Serious ARG, conducted by the author that assisted 1st Year students during Induction Week on the Dundalk Institute of Technology college campus, is also outlined. This provides a test case, exemplifying the structures and patterns constituting Serious ARGs.

Introduction

A relatively new game genre, Alternate Reality Games (ARGs) affords the public with a challenging and thought-provoking game. Using the Internet as a platform, players operate as digital detectives. Collaboratively working together, they uncover an underlying narrative. Game creators, known as *puppetmasters* (PMs), typically use the Internet to initially disperse their game clues and monitor game play. Meanwhile, players pool their resources collaboratively to solve problems, piece together the narrative, and discuss the game, typically on *Unforum*, the primary player forum for the ARG community. The games are played out on, and bound by, the Internet. Online, collaborative communities are the driving force behind all ARGs.

Since the turn of this century, a range of experimental media products has emerged to feed the public's appetite for challenging media products. Examples include novels such as *The Da Vinci Code* (Brown, 2003), *Digital Fortress* (Brown, 1998), *Cathy's Book* (Stewart, 2006), the autobiographical *Mysterious Stranger* (Blaine, 2002), TV shows *CSI* (Bruckheimer, 2000-2013), *Numb3rs* (Scott, 2005-2010), *Lost* (Abrams, 2004-2010) and *The Code* (Du Sautoy, 2011), the social film *The Inside Experience* (Caruso, 2011), and Dr Kawashima's *Brain Training* (Nintendo, 2006) games.

The emergence of ARGs at this time has also provided the public with a stimulating cross media game. The first of these games, *The Beast* (Microsoft, 2001), emerged in the spring of 2001. Developed by 42 Entertainment, alongside Microsoft, *The Beast* was created as a marketing vehicle for the Steven Spielberg movie *A.I.: Artificial Intelligence* (Spielberg, 2001). The highly successful ARG blended aspects from the movie into a twelve-week, murder-mystery narrative game where players interacted with game characters both online and offline, to collate its fragmented pieces into a more discernable story. The success of *The Beast* helped stimulate the formation of a new genre and inspire a generation of interactive writers.

The advent of the Internet and the evolution towards Web 2.0 has helped integrate traditional media forms with new and innovative media forms into a single narrative form. Today, stories are presented in a variety of ways including (static or dynamic) websites, online journals and blogs, distributed narratives or as part of a wider interactive digital narrative gaming form. The convergence of narrative and gaming forms, combined with Web 2.0 tools, has paved the way for storytelling to transverse across different platforms, as part of the overarching New Media Narrative

sector. The emergence of a multidisciplinary narrative and gaming form, one that blends traditional storytelling with everyday technologies, produces an interactive experience, providing innovative teaching and learning opportunities. The ability of ARGs to engrain diverse learning in an interactive learning environment showcases their adaptability and attractiveness as a GBL tool.

Serious ARGs

To date, ARGs have mainly focused on providing engaging and entertaining experiences for players and PMs. In Serious ARGs, the learning process is weaved throughout the game play to create an alternative way for learners to gain knowledge and understanding of a subject matter. However, thus far, their use has been somewhat limited. Serious ARG creators are faced with the typical challenges of any ARG creator i.e. adherence to ARG rules, developing an engaging and flexible narrative, promoting a strong sense of collaboration amongst its community and providing a captivating and immersive game. However, Serious ARG creators face additional challenges, including questions concerning the resource (time and money) effectiveness, problem solving, motivational (intrinsic and/or extrinsic), and the learning-centred aspects of their ARG. Though there are clear pedagogical benefits to well-designed Serious ARGs, creators must address the aforementioned challenges. While there is significant potential for Serious ARGs, their complexity may be one of the reasons why they are not more abundantly created as a GBL tool.

Compared to traditional computer games, the barriers to entry for ARGs are low. For example, an ARG can be developed upon the creation of a small number of websites and email addresses. The development of an imaginative narrative, which can be effected by the players through everyday multi-media technologies, is not only universally available to most, but is also cost effective, in comparison to high-end 3D computer and video games. Examples of Serious ARGs include:

- *Aftershock* (boingboing, 2008)
 - Provided players with practical knowledge on the effects of an earthquake on the San Andreas Fault in Southern California and guidelines on how to react to such an event.

- *The Tower of Babel* (University of the West of Scotland, 2010)
 - An EU-commissioned project that helps teachers use the Internet within language education.
- *Traces of Hope* (British Red Cross, 2008)
 - A game that highlighted the plight of civilians caught up in war.
- *Vanished* (MIT, 2011)
 - A MIT and Smithsonian initiative aimed at 10-14 year olds, which challenges the players to decipher clues and the mystery surrounding an environmental disaster on Planet Earth.
- *World Without Oil* (World Without Oil, 2007)
 - Invited people to collectively explore future-changing action regarding our planet's over-dependency on oil.

Essentially, the primary objective of each of the aforementioned Serious ARGs was to meaningfully educate their players through the medium of play, akin to the ethos of GBL.

ARG Game Features

The figure below represents the key game features of ARGs.

Whilst the features listed are characteristics of traditional ARGs, they too, are also found in educational or Serious ARGs. The creation of an interactive narrative, ably affected by the players, can create a collaborative, GBL environment.

However, ARGs are not without their problems. Most notably, the game genre is a complex form, and its ambiguous and fragmented nature goes hand-in-hand with a high chance of failure (implosion). This complexity and the issues surrounding the substantial amount of implosions in ARGs were addressed in a study. The basis for this study, including a comprehensive content analysis examination of *Unforum*, and its subsequent findings are outlined now.

- **This Is Not A Game – TINAG**

ARGs blur the lines of reality and fiction, asking the ‘players’ to suspend their disbelief and deem what they are experiencing as real. This is known as the *TINAG* mantra.

- **Rabbit Holes/Trailheads**

PMs initially entice players to play an ARG through a series of rabbit holes or trailheads (posters, phone calls, messages, emails, websites, adverts, or packages). The rabbit hole creates intrigue and should captivate players’ attention. Rabbit holes/trailheads are the first portal of entry for players into an ARG.

- **Player/Character Interaction**

ARG players interact with characters through multiple media elements. For example print, telephones, email, websites, chat, radio and television adverts.

- **Narrative with White Space**

White Space may be defined as gaps in the underlying narrative, which are developed and influenced solely by the players through game play.

- **The Curtain or Fourth Wall**

An imaginary barrier that separates the PM from the players. The separation allows the players to discuss, play and develop the game without interference from the PM.

- **Agency**

Agency is the feeling that player’s experience when their actions influence the ARG.

- **Collaboration & Community**

ARGs are created for the hive mind, meaning that one person alone cannot complete a game. Collaboration is key to a successful ARG community.

Figure 1.1: ARG Game Features

The ARG World Model

The complexity of the game genre may be eased by *The ARG World Model* (Figure 1.2), which illustrates components of an ARG – narrative, game play, collaboration/community and *white space*.



Figure 1.2: The ARG World Model

Each of these components also contains sub-sections. These sub-sections are detailed in Figure 1.3.

When combined together, the three main components (narrative, game play and collaboration/community) make up the majority of *The ARG World Model*. These three divisions are equal in importance. The final, and smallest piece of the *Model* is *white space*. Whilst the majority of the game is planned prior to its launch, PMs should factor in some gaps in the narrative (*white space*), developed and influenced by the players through their game play.

An integral part of any ARG is the narrative that binds the game together. Whilst narrative themes for ARGs are varied, the creation of an interactive, non-linear storyline that intrigues its players is a necessity for

an ARG to succeed. It is imperative that PMs design and create an ARG with a suitable narrative theme that captivates their players' attention.

- **Narrative:**

Contains the narrative theme, the interactive writing aspect of the ARG, and non-linear structure associated with interactive narrative gaming.

- **Game Play:**

Contains multiple media interaction (online/offline) and real world events (offline). Also contains rules that should be adhered to, and respected.

- **Collaboration/Community:**

Collaborative play as opposed to competitive play is encouraged.

- **White Space**

Elements of the narrative developed by the players which formulates a sense of empowerment within the players.

- **The PM & the PM Team**

Remain behind The Curtain during game play. Abide by ARG and Unforum rules.

Figure 1.3: The ARG World Model Components & Sub-Sections

Central to all successful ARGs is good game play. Players need to be able to interact with the game and its characters through everyday technologies. Characters in turn, should respond intuitively to players, in whatever format is deemed most applicable to the nature of the ARG, whether that is online, or offline. Players and PMs, alike, must respect and adhere to the game genres rules, in order to give the ARG the best possible chance of it reaching a successful conclusion.

Collaboration is at the heart of ARGs. In general, ARGs are created for the hive mind, such that one person alone cannot complete a game. Players work collaboratively online, or in the real world, to complete tasks, decipher clues and piece together the narrative, often requiring the assistance of others to achieve success. Competitiveness amongst the playing group is discouraged, although sometimes elements of friendly competition creep into ARG play.

Whilst the majority of any ARG is developed prior to its launch, aspects of players' input in the game can be factored into the overall narrative while the game is still in progress. The allowance for *white space*, factoring player input into the game, helps to create a sense of *agency* amongst the playing group, incentivising them to continue to play the game. This also helps to dispel the notion that the game is predetermined.

The PM and the PM Team should remain on the periphery of the game whilst it is still in progress. Puppetmasters will be able to interact with the

game players through their own characters, and be aware of the plight of the players by monitoring their progression from behind *The Curtain*. Stepping out from behind *The Curtain* breaks the illusion of *TINAG*, and impinges on the game experience of the players.

Literature Review

In recent years, there has been a rapid growth in the creation of computer games for educational purposes. These educational games, known as *Serious Games*, have been developed for both children and adults. They differ from entertainment games in that there is particular focus on their learning outcomes. Computer games have many pedagogical benefits. “Computer games can provide constructivist-learning environments where students develop their own understandings through problem solving and exploration. They can create the opportunity for players to enter immersive...worlds, provide purposeful contexts for practising skills that can be applied to the real world, and provide a context for working with other people to achieve shared goals” (Whitton, 2010a). From behaviourist drill-and-practice games to constructivist learning environments, computer games provide opportunities for students to collaboratively solve problems, and learn from their experiences (de Freitas, 2006), (Whitton, 2010b).

Game-Based Learning (GBL), the product of *Serious Games*, deals with clearly defined learning outcomes through the medium of play. According to Kevin Corti, “Game Based Learning (a.k.a *Serious Games*) is all about leveraging the power of computer games to captivate and engage end users for a specific purpose, such as to develop new knowledge and skills” (Corti, 2006). By virtue of their ability to actively engage, and stimulate players to retain the information presented to them, *Serious Games* offer an alternative way for educators to present material to learners. In *Serious Games: Games that Educate, Train and Inform*, the authors, David Michael and Sande Chen state, “*Serious Games* do not have entertainment, enjoyment, or fun as their primary purpose” (Michael and Chen, 2005:p.21). While arguing that the main objective with *Serious Games* is to get players to learn something, Michael and Chen argue that if possible, players should, collaboratively, have fun doing so.

In his seminal work on history-based video games, Jeremiah McCall points out that “the best simulation games offer radically different presentations of the past from traditional media, combining interactivity, engaging challenges, eye-catching graphics and sounds, and compelling game play” (McCall, 2011:p.19). Collaborative game play allows players

to gain insightful knowledge in a game-like engaging environment, presenting an opportunity for independent collective learning - “assigning students to play the game in groups creates a far more effective learning environment for several reasons. First and foremost, employing play teams emphasises development of collaboration skills. In addition to being an important skill in its own right, collaboration allows students to help one another when playing, pooling their talents and insights” (McCall, 2009: p.78). Fundamentally, collective game play allows players to collaboratively learn, together.

Serious Games allow players to participate in an interactive and engaging environment. This not only gains their attention but also harnesses the retention of information in a meaningful game play manner. Interaction with game characters and fellow players, allows learners to develop social skills, while complex narratives provide ways to enhance their problem-solving capabilities (Bruer, 1993), (de Freitas, 2006), (Kirriemuir, 2004 and MacFarland, 2004), (Moseley, 2008). Ultimately, players gain knowledge and understanding of a subject matter through the medium of play. The recent technological advancements have not just altered the ways in which students learn, but also have led to the adaptation of alternative teaching methods for educators.

Many gaming and media theorists have put forward views on the creative practices of recent times that have led to a convergence of art, gaming, media and narrative forms (Dena, 2009). Whether described as ‘transmedia storytelling’ (Jenkins, 2006), ‘distributed narratives’ (Walker Rettberg, 2004), ‘cross-sited narratives’ (Ruppel, 2006), ‘very distributed stories’ (Davenport, 2000), ‘ubiquitous games’ (McGonigal, 2006) or ‘pervasive games’ (Montola, 2009), the convergence of narrative and games has allowed readers, players and users alike to experience New Media Narratives across a multitude of media platforms. These experiences have, more often than not, been purely for entertainment purposes. But the development of New Media Narratives, including ARGs, has presented the opportunity for teachers to embrace the convergence of narrative and technology, for educational purposes into the classroom setting.

Implementing ARGs in an educational context provides many pedagogical possibilities. ARGs “offer several educational advantages related to Web literacy and gaming. The collaborative nature of game play encourages teamwork and interpersonal skills, both for face-to-face and distance groups...the complexity and diversity of ARG content appeals to diverse learners, learning styles, and literacies. ARGs also offer a fascinating subject for study in any number of settings and disciplines, including identity, community, peer support/mentoring and cognitive

studies. ARGs are also useful in training and corporate environments, where they are able to generate knowledge, experience and reflection through lifelike events and environments” (ARGology, 2010). Conversely, Serious ARGs may be seen as an unnecessary expense that diminishes the role of the educator. However, the readily available technologies and the relative cost-effectiveness highlight the appropriateness of ARGs as a GBL tool. Alexander (Alexander, 2006), argues that ARGs offer “deep learning...inexpensive and engaging” qualities. Indeed, in the creation of an ARG, specifically designed for young children at a South London Primary School, Colvert reports on the wide-ranging benefits of running the game using everyday, readily-available technologies “...children are not required to develop programming skills or negotiate gaming software. Instead the players and designers of ARGs create the game elements through the creative and inventive use of ubiquitous communication technologies and artifacts...in this, the children collaborated with the teacher to design and play an ARG with and for their peers. This research demonstrates that ARGs represent an innovative means for children to explore and develop their understanding and experiences of learning and literacy practices across media. In this project, the students made good use of their existing knowledge of games and the affordances of various media and narrative conventions. Through the active production of ARGs, they explored the relationships between these forms, in new ways” (Colvert, 2009: p. 1). The players were also able to experience situations where they felt they had a direct effect on the game’s progression i.e. the allowance for *white space* provides players with a sense of control in the game.

In *Encouraging Engagement in Game-Based Learning*, Whitton (Whitton, 2011), adds her voice to the argument for the pedagogical advantages of ARGs. These centre on “collaborative puzzle-solving, as players are required to work together to solve the challenges that the game presents; game play is active and experiential; the game provides a meaningful context for activity, both online and in the real world; and, as ARGs generally take place over an extended time period, they provide the time and space for reflection”. Additionally, ARG players act as themselves when playing, rather than assuming the role of a fictional character, a feature often distinctly different from traditional types of educational computer games (Lee, 2006). This can prove advantageous as it helps blur the lines of reality and fiction and immerse players in an alternate, though life-like world. Furthermore, there is anecdotal evidence that ARGs appeal equally to both male and female players (Lee, 2006), illustrating the intriguing nature of the game genre to both sexes. Losowsky also adds, “in the best ARGs, the puppetmasters are prepared

for the fact that the narrative structure they have in mind at the start will later evolve due to players' actions and discussions. As the puppetmasters can control the timing of the release of each moment of plot development, and delay them if necessary, they have time to make any changes they feel suitable, in response to players' creativity" (Losowsky, 2005: p. 7). The implementation of player input (*white space*), into any ARG, entertainment or educational, is an appealing feature that draws players to play, and learn, and continue to play, and learn.

Connolly et al (2011), argue that the realistic environments that ARGs can portray offer more than just educational value for the players, citing the aforementioned *World Without Oil (WWO)* as an example of the knock-on effect of the learning – “the value of the WWO ARG was in playing out scenarios in a serious way, it aimed to apply collective intelligence and imagination to the problem in advance and create a record that had value for key stakeholders such as educators, policymakers and the public in helping anticipate realistic future scenarios and prevent their worst outcomes through building a community” (Connolly, 2011). Although WWO comes in for criticism for its lack of a collaborative storyline or a trail of puzzles (Brackin, 2008), Connolly et al (2011) felt that the ARG conjured up serious and educational debate on the subject matter, affording an innovative, deep learning experience for its players.

Moseley, also outlines several aspects that make ARGs a compelling subject for higher education. Firstly, “they induce extreme levels of engagement and motivation in some of the players...secondly, they have a strong communal aspect - with players working together in teams or en masse to solve difficult or geographically/intellectually widespread problems...and thirdly, in contrast to other online immersive environments such as *Second Life* or massive multiplayer games like *World of Warcraft*, ARGs can and have existed simply with a few basic web pages and some scraps of paper: their technical basis can be as small or complex as the budget or game play require” (Moseley, 2009: p. 12). In agreeing with Cohert, Moseley acknowledges the ease and relative cost-effectiveness of producing an ARG. Additionally, Moseley appreciates the educational value of playing ARGs, adding:

“...I realised what a valuable lesson I was learning in educational practice: I'd achieved and seen levels of engagement and communal interaction in my fellow players never before seen in my higher education context...it is not just the length of the engagement, though, but the depth” (Moseley, 2008: p. 2).

It is this kind of deep learning that ARGs offer, that educators and learners aspire to.

Moseley's research in GBL, subject-based research skills delivery, social media, and museum games for education has allowed him to construct a list of seven pedagogic benefits of ARGs (Moseley, 2008), which help to illustrate the application of ARGs as a GBL tool:

1. Problem solving at varying levels (graded challenge)

- Enable students to pick their own starting level and work up from there.

2. Progress and rewards (leader board, grand prize)

- This could also be assessment.

3. Narrative devices (characters/plot/story)

- Note: doesn't have to be fictional: academic subjects have histories, themes, news etc.

4. Influence on outcomes

- As researchers we don't think that we are working towards a known answer or statement; and we would like our students to think in the same way: by letting them decide or influence some aspects of their course, this helps to scaffold their path into a critical academic thinker.

5. Regular delivery of new problems/events

- Key to maintaining engagement. Thinking about ways to keep things moving without putting extra pressure on staff.

6. Potential for large, active community

- Which is self-supporting/scaffolding - the potential is less the smaller the group and the narrower the subject interest/specialisation.

7. Based on simple, existing technologies/media

- Because they rely predominantly on existing web technologies, they do not require the high-end production values and therefore do not need the same levels of technical expertise or expense to produce as commercial games. This makes them a much more practical and feasible game-based option for education.

Figure 1.4: Seven Pedagogic Benefits of ARGs (Moseley, 2008; 2009)

Literature has shown that ARGs can offer deep levels of engagement and motivation, collaborative learning, a cost-effective product and a rewarding experience for their players. These attributes help to indicate the suitability of ARGs as a GBL tool.

Methods

A combination of *interpretivism* and *pragmatism* philosophies guided the methodology of this study. The subjectivity of the *interpretivism* philosophy, combined with the *pragmatic* focus of linking practice and theory provided the platform for the study. As such, theory was derived

from practice, thus allowing it to be applied back into practice. This took the form of analyzing the views and opinions of the ARG community on *Unforum*. Players' opinions on successful and unsuccessful ARGs were taken into account, focusing on their views on the factors that led to their success or failure. Emphasis was placed on the practical adoption of development techniques, which in turn developed into theoretical ones.

An inductive approach was employed when analyzing the data on the General Meta Discussion section on *Unforum*. Inductive reasoning begins with making specific observations, notating patterns, before proceeding to a generalisation that is likely, given the evidence, but not certain. The systematic structuring of important forum posts (data) into matrices followed, before a tentative hypothesis towards the most likely theoretical inferences was made. The proposed evaluation criteria were then extracted (a summary of the evaluation criteria are outlined in the *Guidelines* section of this chapter section). The approach taken was to examine the relevant topics on *Unforum* that appeared to best answer the research questions:

- What are the factors that lead to a successful ARG?
- What steps can be taken to alleviate the chances of ARG implosion?

The content analysis technique of analyzing data on *Unforum* was employed in extracting evaluation criteria. This process is briefly outlined below.

Content Analysis

Content analysis was chosen as the primary technique used for the research because of the way in which it systematically reduces large amounts of text into fewer content categories based on an explicit set of coding rules. Outlined by Bryson in *The Communication of Ideas*, content analysis is defined by Laswell as the study of “Who (says) What (to) Whom (in) What Channel (with) What Effect” (Lasswell, 1948). Content analysis was conducted on the forum posts on the General META Discussion section of *Unforum*.

Krippendorff's work in *Content Analysis: An Introduction to Its Methodology* (2nd edition) (Krippendorff, 2004) provided guidance with the content analysis process. While the initial stages of content analysis were exploratory, the process became more structured and systematic as the research evolved. Krippendorff proposes that this is achieved by providing guidance on unitising, sampling, recording and coding, analysing and constructing, and testing for reliability and validity. Tasks

associated with this particular study, guided by Krippendorff's content analysis process, are outlined below:

- **Sampling forum posts:**

496 forum posts on the General Meta Discussion section on Unforum were initially reviewed. Following the formation and adherence to rules (outlined later), a sample of 89 forum topics was selected for further analysis. The reasons why these 89 forum topics were sampled are outlined in the content analysis rules table.

- **Defining the basic analytical units:**

All players' opinions on every forum thread were equal to the basic analytical unit. In the case of the research to date, each Unforum posters view was taken as the unitary statement i.e. there could be a number of views within a sentence or paragraph and each of these views would be considered as a basic analytical unit.

- **Recording and coding:**

Following a rigorous rule set, data was sorted under categories and sub-categories that emerged from the content analysis process.

- **Analysing:**

Patterns and trends were detected amongst the forum's posts.

- **Constructing results:**

Tables and matrices presented the results. The presentation of the results was guided by the work of Miles and Huberman (outlined later)

- **Testing for reliability and validity:**

An initial pilot study was carried out to test the content analysis process. The researcher developed and honed their content analysis process over a period of time until the procedure met reliability and validity needs. All posters' opinions were considered.

Figure 1.5: Framing the Content Analysis Process

A number of additional steps were adhered to, when making decisions on how to treat all topics consistently on the General Meta Discussion section of *Unforum*. These steps are outlined below:

- If the topic had less than three replies, this topic was disregarded. In order to give a balance of views, the researchers felt that a number (at least three) posts needed to be made on a particular topic in order for it to be considered for content analysis.
- Each topic title was reviewed, and a keyword associated with it.
- Titles bearing no relevance to the research question were disregarded.
- Categories were derived from the keywords and the topics. These categories included: narrative, pre-games, The Curtain, interaction, community, agency etc. Each topic was labeled into a relevant category.
- Sub-categories of the overriding category were created. For example topics dealing with ‘Chat’ were categorized under ‘Interaction’, with sub-category, ‘Chat’.
- Trends and patterns within the data based on the communities’ opinion were identified. All relevant posts, and all arguments, for and against, were included. Particular attention was paid to:
 - o information declared important in affecting the game quality or players experiences.
 - o cases in which an issue is mentioned repeatedly, i.e. the number of critiques on this issue.
 - o the type of language used as it provided clues as to the strength of an opinion held.
- Tables of relevant quoted data from the forum, were formed, labelled and colour coded. Summary and key points tables were also developed.
- Finally, evaluation criteria were drawn from the key points, where players make evaluative-type judgements. Evaluation criteria tables were developed. Evaluation criteria could not be drawn from all key points. Some points simply did not contain judgements, adequate support, or did not appear to contain critiques that logically might lead to an evaluation criterion. Negative comments were taken into account to balance the views on the forum. It was ensured that there was sufficient back up from the forum, supporting what the evaluation criterion outlines i.e. all evaluation criterion extracted from the forum derived from statements posted by the players on the forum.

Figure 1.6: Detailing the Content Analysis Rules

The work of Miles and Huberman in *Qualitative Data Analysis* (1994) helped direct the research, in terms of presenting the results of the study. Miles and Huberman define analysis as “consisting of three con-current flows of activity: *data reduction*, *data display* and *conclusion drawing* and *verification*, which form an interactive, cyclical process” (Miles and huberman, 1994). The reasons behind game failures were collected and analysed based on player posts on *Unforum* [data was *reduced* from 496 topics to 89 relevant topics]. This process enabled the formation and *display* of matrices of the various factors associated with game implosions, in turn helping to extract patterns from the data. The matrices assisted in establishing theory and reasoning behind the patterns of data. The process *concluded* when sixteen evaluation criteria were extracted from the patterns. Some criteria were later tested and *verified* in the Dundalk Institute of Technology Induction Week ARG (*DIWARG*).

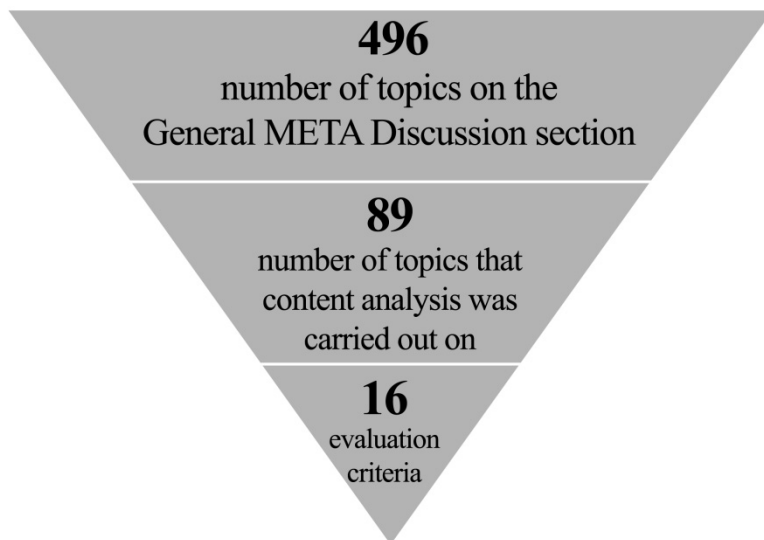


Figure 1.7: Content Analysis Reduction

The sixteen evaluation criteria are proffered to act as guidelines for potential PMs, to provide them with a ‘best practice’ set of parameters to use when creating, managing and running an ARG.

Dundalk Institute of Technology Induction Week Alternate Reality Game (*DIWARG*)

The Dundalk Institute of Technology Induction Week ARG (*DIWARG*), played on Monday 12th September 2011, served two purposes. Firstly, it tested elements of the evaluation criteria that were previously extracted following analysis of *Unforum*, and secondly, it satisfied the wishes of the Institute’s School of Informatics and Creative Arts to take an innovative and enjoyable approach to introducing its first year students to the DkIT college campus (Dundalk Institute of Technology, 2013). The literature reporting on two prior ARGs guided the planning of *DIWARG*. These were: the *Alternate Reality Games for Orientation, Socialisation and Induction (ARGOSI)*, which aimed to engage and introduce students to university life at Manchester Metropolitan University and the University of Bolton (Whitton, 2011), and *The Inside Experience* (Caruso, 2011), a social film experience that blended film and social media and allowed the audience to interact with characters in real time. The aim of *DIWARG* was