

# **Learning with Digital Games**

A Practical Guide to Engaging  
Students in Higher Education

**Nicola Whitton**



The Open and Flexible Learning Series

# Learning with Digital Games

A Practical Guide to Engaging Students in  
Higher Education

Nicola Whitton



First published 2010  
by Routledge  
270 Madison Ave, New York, NY 10016

Simultaneously published in the UK  
by Routledge  
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

*Routledge is an imprint of the Taylor & Francis Group, an informa business*

© 2010 Taylor and Francis

Typeset in Minion by  
HWA Text and Data Management, London  
Printed and bound in the United States of America on acid-free paper by  
Walsworth Publishing Company, Marceline, MO

All rights reserved. No part of this book may be reprinted or reproduced or utilized in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

**Trademark Notice:** Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

*Library of Congress Cataloging in Publication Data*  
Whitton, Nicola.

Learning with digital games : a practical guide to engaging students in higher education / by Nicola Whitton.

p. cm. – (The open and flexible learning series)

Includes bibliographical references and index.

1. Education, Higher – Computer-assisted instruction. 2. Computer games.

3. Educational games. I. Title.

LB2395.7.W55 2009

378.1'7370285–dc22

2009005748

ISBN 10: 0-415-99774-7 (hbk)

ISBN 10: 0-415-99775-5 (pbk)

ISBN 10: 0-203-87298-3 (ebk)

ISBN 13: 978-0-415-99774-4 (hbk)

ISBN 13: 978-0-415-99775-1 (pbk)

ISBN 13: 978-0-203-87298-7 (ebk)

## Series Editor's Foreword

If there was any doubt about the popularity of computer games and their potential use in education, then a consideration of their sales and sums involved will dispel any doubt. Similarly, any visit to a household, or chat with friends and colleagues, will confirm the penetration of digital games into the home – and the hours of dedicated interaction by players.

In 2008, in the UK and the USA, the sale of computer games increased by over 40 and 20 per cent respectively, and achieved sales of £4.64 billion in the UK and \$32 billion in the USA. In both countries, sales of digital games were higher than music CDs and videos combined. In the same year, Nintendo launched its new *Wii* Games Console in the USA and sold 600,000 units in the first eight days; Nintendo estimates sales of 50 million units by March 2009. This is in addition to the sales of the other two game providers – Microsoft's Xbox and Sony's PlayStation 3. This represents an impressive take-up of the technology and application.

In contrast, higher education institutions have been slow to explore and exploit the potential of such digital games – despite the massive investment in communication and information technology. For many in higher education the focus of digital games on entertainment rather than education, and a focus on low-level conceptual skills in educational gaming, are often cited as reasons why such games are of limited value. (However, you will discover that Nicola argues, and provides evidence, that educational applications are both possible and effective and that higher levels skills can be deployed within such games.) Educationalists also argue that the sophisticated technical skills required of those constructing the games, and enormous development costs,

makes their use prohibitive in higher education. Whilst Nicola acknowledges these points she does provide advice, assistance and resources that can mitigate their constraints. Certainly, this book, *Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education* by Nicola Whitton, not only gives us access to the world of digital games but the tools and frameworks to become part of it.

Nicola provides a sound rationale for the inclusion of digital games into the repertoire of teachers in higher education. She draws upon her own research in the field, and knowledge of it, in presenting an insight into the theory, practice and technology associated with this world. In the past, you may have found those steeped in a particular academic area to be dismissive of the problems that novices face or evangelical in their claims – not Nicola. She is realistic – it is reassuring to hear her say that ‘games are not necessarily an appropriate way of teaching everything’ – and pragmatic in her approach. She bases her arguments on sound educational principles and supplements these with practical advice and concrete examples, criteria against which you can judge the development of digital games and activities and which will enable you to create your own. What I particularly like about the book is that throughout, Nicola stresses the importance of clear learning objectives, activities to realize these coupled with assessment of the learning outcomes. The supplementary website promises to be a unique source of help and information.

This book has certainly encouraged me to reassess some of the ‘paper-based’ games I have developed as well as motivating me to think of new applications in my teaching. I am sure it will do the same for you – contributing to your teaching and to student learning.

Fred Lockwood  
Yelvertoft, February 2009

## Acknowledgements

I would like to thank everyone who has provided me with support and advice during the writing of this book. In particular Fred Lockwood, whose guidance has been invaluable, and Sue Beasley, Thomas Hainey, Hanno Hildmann and Paul Hollins for their insights and feedback.

I am especially grateful to the people who have contributed case studies and shared their experiences: Chris Goldsmith, Richard Hall, Niki Hynes, John Pal, Katie Piatt, Mark Stubbs, David White and Elisabeth Yaneske.

I would also like to thank everyone who has kindly helped me to secure permission to use the screen shots that feature throughout this book, in particular Bart Bonte, Robert Firebaugh, Nora Herron, Andreas Holzinger, Martin Kerstein, Martin Klima, Jobe Makar, David Münnich, Cathy Orr, Terri Perkins, Elias Pimenidis, Leslie Rosenthal, Ben Ringold, Adam Tuckwell and Robert Wahlstedt.

Finally, I would like to offer my very grateful thanks to my long-suffering husband, Peter, who, through his unwavering support and sound advice, has somehow managed to keep me sane over the past year.

# Contents

Series Editor's Foreword	xiii
Acknowledgements	xv
1 Introduction	1
<i>Background to the Book</i>	2
<i>The Higher Education Context</i>	4
<i>Structure of the Book</i>	8
<i>Web Resources to Accompany the Book</i>	11
<i>Examples Used throughout the Book</i>	12
<b>PART I</b>	
<b>Theory</b>	<b>17</b>
2 Recognizing the Characteristics of Digital Games	19
<i>Defining Digital Games for Learning</i>	19
<i>Ways of Defining Games</i>	20
<i>Game Characteristics and Learning</i>	31
3 Understanding the Pedagogy of Digital Games	35
<i>Learning and Motivation in Higher Education</i>	36
<i>A Study on Adult Attitudes to Games</i>	38
<i>Digital Games and Engagement</i>	41
<i>A Rationale for Digital Games in Higher Education</i>	44

4	Identifying Types of Digital Games for Learning	55
	<i>Types of Digital Game Available to Educators</i>	55
	<i>Types of Learning that can be Facilitated with Games</i>	64
	<i>New Directions in Digital Games for Learning</i>	68
<b>PART II</b>		
	<b>Practice</b>	<b>75</b>
5	Integrating Digital Games Into the Curriculum	77
	<i>Analysing the Learning Context</i>	77
	<i>Gaming Online and Face-to-Face</i>	83
	<i>Models of Integration</i>	85
6	Designing a Digital Game for Learning	89
	<i>Pedagogic Design Considerations</i>	89
	<i>Designing Digital Games for Learning</i>	97
7	Assessing the Impact of Digital Games on Learning	103
	<i>Assessment of Learning from Digital Games</i>	104
	<i>Researching Learning with Digital Games</i>	106
	<i>Ethics of Researching Learning</i>	113
<b>PART III</b>		
	<b>Technology</b>	<b>117</b>
8	Using Existing Digital Games for Learning	119
	<i>Differences between Games for Entertainment and Learning</i>	120
	<i>Types of Existing Game for Learning</i>	125
	<i>Obtaining Existing Games</i>	130
9	Developing New Digital Games for Learning	135
	<i>Creating New Games for Learning</i>	136
	<i>Skills Required for Game Creation</i>	139
	<i>Developing a Functional Specification</i>	140
	<i>Creating a Balanced Game for Learning</i>	143
	<i>Software for Creating Games</i>	148



10	Evaluating Digital Games for Learning	153
	<i>Iterative User-Centred Design</i>	153
	<i>Evaluating Digital Games</i>	159
11	Case Studies	167
	<i>Case Study 1: Who is Herring Hale?</i>	167
	<i>Case Study 2: Marketplace</i>	171
	<i>Case Study 3: PeaceMaker</i>	174
	<i>Case Study 4: Red Frontier</i>	178
	<i>Case Study 5: The Retail Game</i>	183
	<i>Case Study 6: World of Warcraft</i>	187
12	Conclusions	191
	<i>Areas for Future Research</i>	193
	<i>Challenges for Learning with Digital Games</i>	196
	Glossary	199
	References	201
	Index	207

# CHAPTER 1

## Introduction

*Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education* aims to provide a straightforward introduction to the creation and use of computer games to support learning, teaching and assessment with adult learners. It is aimed at anyone with an interest in the use of digital games to enhance teaching, and does not assume a high prior level of technical knowledge, but will take the reader step by step through the design and development processes required to incorporate digital games within higher education. I hope that this text will offer a friendly and accessible introduction to the area, providing inspiration and ideas as well as practical guidance.

I have worked for many years as a developer, teacher and researcher in the field of technology-enhanced learning, with a particular interest in collaborative computer game-based learning. This book is based around the work carried out for my doctoral thesis, 'An investigation into the potential of collaborative computer game-based learning in higher education' (Whitton, 2007). In this volume, my research and experience has been distilled into the lessons learned from this work, with supporting activities to enable the reader to understand the theoretical context, address the practical considerations of using games for learning and consider the best ways in which to implement digital games for learning in your own subject discipline. Throughout I have aimed to keep this book practical in nature, providing advice on the application of digital games in teaching and learning with tips, guidelines, checklists and short case studies.

In the first part of this introductory chapter I explain and discuss the background to the creation of this book, explore the rationale for a book aimed specifically at using computer games with learners in higher education (as

opposed to school-aged learners or in the context of training) and describe the structure of the book and the elements that are contained within it. The second half of the chapter provides some examples from the game-based learning literature of ways in which games have been used in this arena, and aims to provide some initial ideas of the scope and applicability of the medium. I hope that after reading this chapter you will begin to see the potential of digital games for learning and will be enthused to think about ways in which the principles discussed here might apply to your own situations.

### **Background to the Book**

The primary objective of this book is to offer a practical starting point for anyone who is interested in the use of computer games for learning within the higher education context. It is not limited to online games used at a distance, a common conception of computer games for learning, but includes the use of games in a range of environments and circumstances, from face-to-face in traditional classroom settings to online virtual worlds, and draws upon a range of game genres that I feel are particularly appropriate for supporting learning at this level.

*Learning with Digital Games* is aimed at anyone with an interest in games and education, including lecturers, educational developers, e-learning practitioners and researchers. It provides theory to underpin the practical advice and examples provided, though I have tried not to be heavily theoretical – the aim is to allow individuals to apply the principles of game-based learning with technology to improve the student experience.

Although this book draws together pedagogic, practical and technological aspects of learning with digital games, it is not expected that the reader will become an expert in the theories of learning, or a technical mastermind (and a high level of technical expertise is not required to follow the narrative or complete the activities) but will, however, gain the ability to start to consider how to appropriately use the techniques suggested. The pedagogy that underpins the use of technology is central to the ethos of this book and I hope that after reading it, and completing the suggested activities, you will be filled with ideas about different approaches to adopt to make the best use of digital games to enhance teaching, learning and assessment.

This book also aims to provide sound advice and ideas on how to apply digital games to real teaching and learning contexts, based on robust research evidence. It is worth saying up front that at the current time this evidence is somewhat limited in the area of higher education, although several good examples do exist and I hope that the research and evidence base will grow over time. Therefore, while the examples provided in this book are predominantly based in the higher education sphere, I will at times draw on examples and

evidence from children's education, further education, informal learning, training and adult learning in other contexts, where this is appropriate and transferable. Likewise, the techniques and tools provided in the book can also be applied to a similar range of contexts (bearing in mind the differences between learners in higher education and other areas, as discussed in Chapter 3) and I hope that this book will also be of interest to practitioners in these related areas. My own experience is primarily in the UK higher education context, and the majority of the examples and case studies used in this book come from this environment. However, where possible, I have tried to include examples from other spheres, and highlighted differences that may impact on how they may be applied.

*Learning with Digital Games* is unashamedly written from a constructivist learning perspective, taking the underlying philosophical approach that students learn actively by doing things (rather than simply reading or being told about them), and construct their own conceptions of what they are learning, using other people as a way of testing and refining their understandings. While, undoubtedly there are examples of computer games used successfully in an instructional or transmissional model in higher education and in other educational areas, I feel that to understand the real potential of digital games it is best to view them as active learning environments, which have the potential to teach higher level skills such as analysis, application and evaluation (Bloom, 1956) and this is the predominant focus here.

It is worth making the point early on that the reader should recognize that the advice provided in this book, although based on sound evidence and experience, will not apply in every learning and teaching situation. It is crucial to apply the principles described here with discretion and creativity and adapt the use of digital games to the student group, the skills and experience of the teacher, and the nature of the subject area. What this book does aim to provide is the pedagogic understanding and background to help the reader use computer games appropriately in a given situation (or decide that there are alternative, preferable ways to teach or learn).

There are several ways to approach how you use this book: it may be read start-to-finish to provide an introductory overview to the use of digital game-based learning in higher education; you may also choose to work through the activities provided in each chapter as a starting point. It can also be employed as a reference tool or practical manual for the reader to dip into particular areas of interest or research certain topics as and when the need arises. I have included activities throughout, which will take the reader through the process of specifying, designing and obtaining appropriate games for learning in their own contexts, and provide the opportunity to apply the principles described.

In this book I have aimed to cover all the bases concerning the background to digital game-based learning, splitting the main body of the book into three

parts, and looking first at the pedagogic theory, then the application in practice, then the technologies that can be used. On its own, each of these parts also provides an introduction to its respective area, so each can also be seen as stand-alone. I wanted this book to be used as an easily accessible reference, so at the end of each chapter there is a summary of the important points covered in that chapter. I have also tried to contextualize the points that I make in this book as far as possible and use examples and case studies throughout; more detailed examples in the form of extended case studies are also available on the website that accompanies this book.

In my opinion a book that concentrates predominantly on the use of digital games with learners in higher education is needed because, while there are several other excellent books in the area, they tend to focus on the use of games with children, or focus on learning in the context of training, which I feel misses some of the great potential of the field for supporting active and contextualized learning. In the section that follows I will discuss the rationale for thinking about digital games for learning in the context of higher education differently from that in other, more widely explored, areas.

### **The Higher Education Context**

While there have been several excellent books published in recent years that look at the potential of computer game-based learning, in general, these books tend to focus on children's learning and, where adult learning is considered, they tend to be skills-focused, training-related or based around memorization of facts. From my own background as a teacher and educational developer in higher education and a researcher in digital games for learning, I feel that many of the arguments that are made for the use of games with these groups do not always directly transfer to students in higher education and that by focusing on these areas we are not exploring the real potential of digital games.

I believe that there is a great deal that can be learned from other educational fields, including further education, the schools sector, and the commercial and training sectors (and vice versa that much of this book can be applied in these areas), but that an understanding of the differences is important to be able to make informed decisions about how games should be used and what is appropriate in a given context. From my perspective, there are a number of fundamental differences in the ways in which it is appropriate to use games with children, or in drill-and-practice situations, as opposed to the higher level learning that takes place at university, and these are shown in the box opposite.

A concept that I would like to discuss early on, and one that I can safely say is not a premise behind my enthusiasm for computer games for learning, is the notion of the 'games generation', 'digital natives' (Prensky, 2001, 2006) or 'net generation' (Oblinger, 2004). These terms are all used to express the hypothesis

**Acceptability**

The way in which the concepts of play and fun are perceived during learning differs in higher education. While they might be seen as appropriate elements within the context of children's learning, games are perceived by many learners and teachers in higher education as frivolous and a distraction. Perceptions of the appropriateness of games will affect the degree to which they are seen as acceptable by their users, so a greater emphasis on the purposefulness of games and on their pedagogic rationale is required in this context.

**Applicability to the real world**

Learners in higher education, and adult learners in general, are more likely to need to see the real-world relevance of what they are learning and be able to transfer what they have learned into authentic contexts. This has implications for the design of games and their supporting activities outside the game environment.

**Assessment**

The assessment of digital games for learning is one of the key issues that this book aims to address, and whether or not a game is assessed will affect the dynamic of its use and the engagement of learners. Lecturers in higher education also have a great deal more flexibility in the way in which courses are assessed than teachers in schools, and it is this freedom that creates greater potential for the integration of effective digital game-based learning, while at the same time raising questions about the types of assessment that are appropriate at this level.

**Cognitive level of learning outcomes**

The nature of the learning outcomes at university level (particularly at the end of an undergraduate degree and in postgraduate studies) do not focus simply on memorization, repetition of facts or understanding of a topic. Instead, they tend to focus on higher level cognitive outcomes, looking at skills such as critical thinking, evaluation, synthesis and application, and the types of computer game that are appropriate in this context are different from those used to teach lower-level skills.

continued

### **Motivation**

The motivations of adults, both to undertake learning and to engage in game-based learning are different from those of younger learners. Adults have a range of different reasons for taking part in learning and choose to engage voluntarily in the higher education system. Computer games are often justified in education on the grounds that they are 'motivational', but in my experience this is not necessarily the case for adults (and certainly not all adults). A rationale for the use of games simply as motivational tools is not appropriate in higher education and is an oversimplification of the motivations that surround adult engagement in learning.

### **Orientation to study**

Students in higher education are required to take a greater responsibility for their own learning, have a greater understanding of the learning process itself and develop more mature and self-reflective attitudes to learning. Concepts such as 'stealth learning' that have been applied to games, where learners learn by playing a game without necessarily understanding what or how they are learning, are not appropriate to this context.

that exposure to technology from an early age has changed the way in which young people (i.e. our current generation of students) think and approach technology. Prensky (2001) describes a definite distinction between 'digital natives' who have grown up with computer games, television and other media, and use them to learn instinctively, and older learners, for whom interacting with these types of technology has to be done through conscious effort. He argues that the generation of people brought up in a world of computers (the majority of our current generation of students) are cognitively different from previous generations and that this immersion in technology has fundamentally changed the way in which people acquire and assimilate information.

This idea is still commonly used as an argument for the use of games in education, although it is now generally thought, by educationalists, to be flawed. I very strongly feel that labelling whole generational groups in this way is not helpful and, indeed, self-limiting – particularly in relation to terms such as 'digital divide' or 'generation gap', which imply that any difference is insurmountable (and serves only to highlight differences rather than focusing on commonality). While it can be useful to highlight that differences do exist, it is important to realize that the situation is more complex than simply two ways of being (e.g. *natives* and *immigrants*) and that individual approaches to technology and information are not necessarily fixed. Bennett



and colleagues (2008) argue, from a recent analysis of the literature on digital natives, that the relationship between young people and technology is more complex and that there is no evidence of generationally different learning styles. They call for a more measured and rigorous research approach, with a plea for a 'considered and rigorous investigation that includes the perspectives of young people and their teachers, and genuinely seeks to understand the situation before proclaiming the need for widespread change' (Bennett *et al.*, 2008: 784).

From my own experience it is factors such as the level and time of exposure to the technology that affect learners' (and teachers') confidence in using it, and alter the ways in which all people interact with and use computers. I can certainly think of older individuals who are far more attuned to using computers than some other individuals in their teens, and feel that there is no reason to assume, just because an individual is confident using computers, that he or she would desire to use them as a method of learning or instinctively knows how to use them effectively in that context. Two recent UK studies provide evidence that students may not be as comfortable with technology for learning and new ways of working as is commonly assumed. In a study of student expectations of higher education, IPSOS MORI (2007) found that while the group of potential students who took part in their study had grown up with technology they did not value the use of technology for its own sake, but instead put a high value on face-to-face teaching and traditional teacher–student interaction. A recent study by CIBER (2008) also provides evidence that the assumption that young people who are brought up in the information age are more web-literate than older people is false. Although young people show an apparent ease with computers, they rely heavily on search engines and lack critical and analytic skills. In fact, the study claims, character traits that are often associated with young web users, such as lack of tolerance of delay in search and navigation, are actually true of all age groups of web users.

In relation to learning in higher education it is also important to recognize that as technology becomes increasingly pervasive, *all learners* will adapt the ways they interact with computers, and that we cannot make sweeping assumptions about a particular generation, or any group of learners. Instead we should cater for all degrees of technical competence and confidence, and accept that many people (of all ages) will simply prefer to communicate, play and learn in ways that are not associated with technology.

Throughout this book I will argue that digital game-based learning is not a simple solution that is going to revolutionize teaching and learning in higher education by appealing to a new 'generation' of learners, nor is it going to appeal to every student in every situation. I think it is important that digital games are seen as simply another tool available to lecturers and teachers, which, when considered and implemented with regard to the constraints of the higher



education system and appropriate pedagogic models, can provide an effective and engaging way to learn.

### Structure of the Book

Following this introductory chapter, the main body of this book is made up of three parts: Theory, Practice and Technology. I then present six case studies detailing the effective use of digital games for learning in different higher education institutions, written by expert practitioners in the field. The book concludes with a final chapter drawing together the themes of the book, highlighting the key lessons, and considering future areas of research. The first part, Theory, provides a context and background to the use of digital games for learning in higher education to underpin the later parts of the book. The second part, Practice, looks at the use of digital games in real teaching and learning situations, and provides lots of tips and advice on how to start thinking about their use in your own area. The third part, Technology, focuses on the game, development software and platforms available and provides a grounding for the reader in the different options that are available for finding (or developing) the type of game required. The final chapter of the book, Conclusions, takes a holistic look at what has been discussed throughout and considers the challenges for digital game-based learning in higher education, as well as discussing future areas for research.

Each of the core parts of the book has three chapters, and all nine chapters include a number of elements to help you navigate their content and easily find the information you are looking for. Every chapter starts with a clear *chapter overview*, which briefly summarizes what you can expect to learn by reading the chapter and undertaking the activities within it. There are a number of *activities* spread throughout each chapter, which are entirely optional, but provide a way to relate the content discussed in the chapter to your own learning and teaching practice, if desired. By undertaking the activities you will be able to work through the process of identifying which types of game may be most appropriate in your own situation, considering the practical implications and constraints, and identifying the appropriate technology to locate, modify or create the game itself.

In order to aid the use of this book for reference, in each chapter *key terms* will be highlighted and definitions can be found in the *glossary* at the end of the book. I have also provided a short *summary* at the end of each chapter as a quick overview of the main points made. In addition, many chapters contain a short list of *further reading* for anyone who is particularly interested in the topic. The following three subsections provide a short overview of each of the chapters in the three main parts in this book.