Review of Serious Games Development in Hong Kong (2006-2016)

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ABSTRACT

This paper investigates existing digital games developed and used in Hong Kong for serious needs. Based on a review done online and by interviewing experts in the field, over 300 games were found being used and developed in Hong Kong. The games are mostly available online for free use. The identified games are categorized into eight types based on their general theme. These are health, special needs, awareness raising (for general public), political games, culture, children's and youth education (all levels), professional training, and marketing and advertisement. While discussing the summarized results of the review, this paper details funding support for serious games and introduces the main contributors to the field in Hong Kong.

Keywords

Serious games, Hong Kong, educational games, game review, China

INTRODUCTION

Digital games nowadays are being actively applied to build connections between entertainment and serious needs such as education, healthcare, awareness raising, and training. Apart from serving as a relaxing and fun pastime, games can help players to solve problems and learn in a casual way. Not unlike the rest of the world, China and Hong Kong have been part of this movement and actively seek new solutions through digital media and games.

This paper investigates existing 'serious games' developed and used in Hong Kong. We follow a liberal definition according to which a serious game is an "interactive computer application, with or without significant hardware component, that has a challenging goal, is fun to play and engaging, incorporates some scoring mechanism, and supplies the user

with skills, knowledge or attitudes useful in reality" (Bergeron 2006). Based on a review done online and by interviewing experts in the field, over 301 games were found being used and developed locally between years 2006 and 2016. The games are mostly available online for free use. Most of the games are for mobile platforms, but the sample also includes three board games in order to illustrate the scope and focus of games. Categorization and preliminary analysis of the games will be provided followed by a discussion about the comprehensiveness of this review.

METHODS

In order to map out as many locally made and used serious games as possible, various search methods were applied. These included 1) online searches using Google search engine; 2) searches in App Store and Google Play; 3) direct email contacts with local developers and professionals; 4) inquiries posted on local game-related online forums and groups, such as Hong Kong Game Development Group on Facebook and Heha Game (http://hk.hehagame.com/); 5) searches on the websites of major research and development funding bodies, such as Innovation Technology Fund (ITF), STEFG-PolyU China Entrepreneurship Fund, and PolyU MicroFund for Innovation & Entrepreneurship; 6) searches on the websites of special schools and organizations, such as Hong Chi Association and Heep Hong Society; and 7) searches on the websites of local NGOs and other organizations with a specific focus on serious games (development), such as Hong Kong Digital Game-Based Learning Association and university departments that conduct games design and research.

In terms of search engine queries, the following keywords combinations were used both in English and in Chinese: 'digital games' + Hong Kong; 'interactive games + Hong Kong; 'serious games' + Hong Kong; 'digital game-based learning' + Hong Kong; 'educational games' + Hong Kong. As the initial search indicated specific focus areas, further searches were made using the keywords 'corporate games' + Hong Kong; 'English learning/e-learning games' + Hong Kong; 'healthcare games' + Hong Kong; 'senior care/self-care' + games + Hong Kong; 'cultural learning' + games + Hong Kong; 'language learning' + games + Hong Kong; and 'marketing/advertisement games' + Hong Kong; autism + games + Hong Kong; and AD/HD + games + Hong Kong.[1]

Based on the searches, 301 games were identified. 70 of them are for mobile devices, three are board games, and 152 games are for web, PC or Mac. The remaining 76 games include interactive installations in shopping malls, 'photo booth' type playful software and gamified marketing campaigns that utilize technologies such as Kinect or VR headsets.

CATEGORIZATION

Based on emerging themes, the identified games were divided into eight categories (see *Table 1*). These are health, special needs, awareness raising (for general public), political games, culture, children's and youth education (all levels), professional training, and marketing and advertisement. The majority of identified games fall under awareness raising category. General cultural and health training games are separated from other educational games because these are typically for a wider and possibly more mature audience. 'Children's and youth education games' category includes games used both at schools as part of curriculum teaching and educational games used outside of formal teaching and learning settings.

Category	Number
Health	12
Special needs	23
Awareness raising	114
Political games	9
Culture	17
Children's and youth education	43
Professional training	3
Marketing and advertisement	80
Total	**301**

Table 1: Serious games categories.

Serious games designed for health

Twelve games were found to address health as a topic. The mobile game *1069 試帶樂* (1069 testing) developed by the Student Health Service of the Department of Health and three games by the Family Planning Association of Hong Kong focus on sex education. Another four games focus on healthy diet and exercise. *Student weight for height check and Lose weight - slimming!* help users to exercise. *The Third Generation Game Booth and Crossword Puzzle*, meanwhile, are designed to educate around health and healthy diet.

Professor Gooley & The Flame of Mind focuses on mental wellbeing and mutual communication and is developed by the Hong Kong Jockey Club Center for Suicide Research and Prevention in collaboration with the University of Hong Kong. Two other games by Hong Kong Fire Service Department focus on personal safety and fire safety. Finally, *The Exit* is a location-based game educating young people about the dangers of substance abuse. Only one of the games (*Lose weight - slimming!*) has a commercial developer, while the other games result from research projects or are projects by government departments.

Serious games designed for special needs

Games for special needs are among the games that seem to gain significant funding from the government and that interest NGOs. For children with attention deficit hyperactivity disorder (ADHD), for example, Hong Chi Association has released a series of mobile and web based games to provide proper training related to emotional development, language skills, and interpersonal communication.

Games in this section can be further divided into games that address specific disorders and disabilities (18 games) and games that link to senior care (5 games). The first category primarily targets ADHD, Autism Spectrum Disorder, and specific learning difficulties. *Table 2* shows an overview of these games in terms of their target users, platform and purpose.

To name a few examples that stand out among the games for special needs*, Cockroach Invasion*, *Good View Hunting* and *Hong Kong Chef* utilize the Microsoft Kinect platform for offering upper limb, lower limb and trunk balance training and can also support multiplayer games. Hong Kong Jockey Club Project C-REHAB, meanwhile, provides a

range of games that address seniors, language disabilities and intellectual disabilities. Among the games for senior citizens (*Table 3*), *Computer Rehab Center — Senior Training District* includes a series of games for seniors and for those with mild cognitive impairment or initial stage of Alzheimer's disease. The games include training for concentration, memory, perceptiveness, and reasoning ability, among others. Cognitive stimulation is the theme of *Six Arts* mobile game, which utilizes the six traditional Chinese art elements as a basis for game design.

Game	Target Users	Genre	Platform	Developer
The ADHD Hero	6-12 years old Children with ADHD	Simulation	Android, iOS	Heep Hong Society
Social Emotion	Children with ADHD	Exergame	Android, iOS	Heep Hong Society
Problem Solving	Children with autism and related disabilities	Exergame	iOS	Heep Hong Society
Social Stories iPad App	Children with autism and related disabilities	Exergame	Android, iOS	Heep Hong Society
Computer Rehab center - Learning Training District	2-12 years old children with learning disability	Casual	Web-based	The Hogn Kong Jockey Club, C-REHAB
Starwish Little Prince	3+ years old Children with language disorders	Language learning	Windows	Starwish Little Prince Studio
Starwish Legend	3+ years old Children with language disorders	Language learning	Windows	Starwish Little Prince Studio
Starwish Adventure	3+ years old Children with language disorders	Language learning	Windows	Starwish Little Prince Studio
Starwish Horoscope	3+ years old Children with language disorders	Language learning	Android, iOS, online	Starwish Little Prince Studio
Starwish Reunion	3+ years old Children with language disorders	Language learning	Android, iOS	Starwish Little Prince Studio
匡智溝通易(Hong Chi Easy Communication)	Children with language disorders	Exergame	Android, iOS	Hong Chi Association
Let's Talk	Children with language disorders	Exergame	Android, iOS	Heep Hong Society
Computer Rehab center - Mental Training District	People with intellectual disabilities	Casual	web-based	The Hong Kong Jockey Club, C-REHAB
Eye Movement Training	3+ years old people with low vision	Exergame	iOS	Ebenezer School
Shapes in Complex	3+ years old people with low vision	Exergame	iOS	Ebenezer School
Dot to Dot (Low Vision)	3+ years old people with low vision	Exergame	iOS	Ebenezer School
Find the Same	3+ years old people with low vision	Exergame	iOS	Ebenezer School
Hope	Children with language disorders	Language learning	Android	Hong Kong Young Women's Christian Association

Table 2: Serious games for disabilities.

Game	Target Users	Genre	Platform	Developer
Cockroach Invasion	Seniors and people with motor disabilities after stroke	Action	Kinect for Windows	The Hong Kong Polytechnic University
Good View Hunting	Seniors and people with motor disabilities after stroke	Action	Kinect for Windows	The Hong Kong Polytechnic University
Hong Kong Chef	Seniors and people with motor disabilities after stroke	Action	Kinect for Windows	The Hong Kong Polytechnic University
Computer Rehab center - Senior Training District	Seniors and people with mild cognitive impairment or initial stage of Alzheimer's disease	Casual	Web-based	The Hong Kong Jockey Club, C-REHAB
Six Arts	Seniors	Casual	iOS	Hong Kong Alzheimer's disease Association

Table 3: Serious games for senior care.

Serious games designed for awareness raising

114 games were identified to focus on awareness raising, while 91 of them address social awareness and 23 of them are about environmental awareness. Among the social awareness raising games, the majority of them (90 games) were developed by Independent Commission Against Corruption (Hong Kong) to promote positive values among children and teenagers on the Internet. All of them are web-based, of which 64 games are of specific topic to anti-corruption, 10 games are about integrity and honesty, and the remaining 16 games aim to train intelligence, behavior, memory, competition, and tolerance.

Among awareness raising games, environmental awareness games are particularly well represented. Given the growing global and local interest in environmental protection, many NGOs and organizations have taken measures to raise people's awareness through novel means. Among others, the World Wide Fund for Nature Hong Kong (WWF HK) has established a series of projects to work with game developers in order to create serious games to help teenagers identify the importance of wetland and animal conservation. The games are *Tundra Animal Rescue Team*, *Rescue Romer's Tree Frog*, *The Savior of Tundra*, *Smart Food Consumer*, *What vegetables are in Season?*, *Help the polar bear!*, *What's in the treasure chest?*, *The Marine Guard*, *Wash It Right*, and *Let's Recycle the Waste*.

Hong Kong Wetland Park is recognized as an internationally significant wetland, and one of the major stops for up to 100,000 migratory birds. However, wetland has been severely threatened by air pollution and traffic pollution. As a result, Hong Kong Wetland Park developed a series of games such as *Sumibear*, *Migration Challenge*, *Track It Down*, and *Nature's Concerto* to enhance teenagers' awareness of wetland conservation. Hagao Studio, a local start-up company also developed a mobile game, *Featherman*, aiming to attract people's attention about protecting wetland conservation.

Carbon Quiz, *Feed4Life*, and *Greenxity* address environmental pollution and were created by the Hong Kong Digital Game-Based Learning Association. Pet Maniac, a mobile game with a particularly well-implemented graphic style also focuses on environmental protection. *PBS Charging* is developed by the Environmental Protection Department of the Government of Hong Kong Special Administrative Region and aims to enhance the public's understanding of plastic shopping bag charging and its exemption arrangement.

Game	Target Users	Keywords	Platform	Developer
Talents of the 3 Kingdoms	3+ years old	Imperial China, Hero, History, Exam	Android	Chinese Stories
A Bartender's Life	12+ years old	HK History, Bar Culture, Drinks	Android	WaterDrophk
Where is Dr. Sun	12+ years old	History, Sun Yat-sen, Revolutionary, Journey, Augmented reality	iOS	Efficiency Unit of HKSAR
King Yin Lei	12+ years old	HK History, Mansion, Architecture	Web-based	Antiquities and Monuments Office Leisure and Cultural Services Department
Lion Dance JR.	12+ years old	Chinese Culture, Culture, Customs	Kinect	XNT
AYITI: The Cost of Life	8-15 years old	Haiti, Culture	iOS, Android	FifthWisdom Technology
Five Thousands Years History of China	8-15 years old	Historical Character, Culture, Role Play	Windows, Mac	FifthWisdom Technology
Burns Incenses	12+ years old	Pray, Culture	Android, iOS	Firebean
Mongolian Conquests	Everyone	History, Strategy, Management	Android, iOS	FifthWisdom Technology
Hong Kong Heritage Museum Leisure and Culture Services Department - Interactive Zone	12+ years old	Heritage, HK History, Culture	Web-based	Hong Kong Heritage Museum Leisure and Culture Services Department
Dream Lantern	12+ years old	Traditional Festival	iOS	Hong Kong Digital Game-based Learning Association
Hong Kong Festival Games	3+ years old	Festival, Easter	Web-based	Home Affairs Department
Dai Pai Dong	3+ years old	Cooking, HK Food	iOS	Application Technology Company
City Café	3+ years old	HK History	Board Game	Fu Hong Society
Hong Kong Cafe	3+ years old	Drinking, HK History	iOS	beejing.com
香港休閒農場 (Hong Kong Leisure Farm)	3+ years old	Farming, Culture	iOS	Vegetable Marketing Organization
Railway Builder	3+ years old	MTR Building	Web-Based	MTR Corporation

Table 4: Serious games for cultural education.

Political games

Nine political games were found in this review. One of them is critical about the current government, while others are created to teach about the functioning of local government, LegCo (Legislative Council of the Hong Kong Special Administrative Region). *Yellow Umbrella* is based on the street demonstrations that took place in Hong Kong in 2014. The so-called 'Umbrella Revolution' started on September 26th and occurred in Hong Kong key areas in Admiralty, Causeway Bay and Mong Kok. The movement lasted 79 days with tens of thousands of protesters. According to its developer Fung Kam Keung, "the game is not only for fun, but also to show our support for the students" (Griffiths, 2014).

LegCo is behind seven web-based games that aim to spread knowledge about law and legislative knowledge. These are *Get Them in Pairs*, *LegCo Quiz*, *How Laws Are Made*, *Spot the Differences*, *LegCo Hunt*, *Colour the LegCo Complex*, and *LegCo Maze*. The web-based games are available online for free. Finally, *I want to Be a Legco Member* created by the public broadcasting service RTHK helps citizens to vote and learn about policymaking.

Serious games designed for culture

There are 17 games organized in this section. *Table 4* shows an overview of the games based on specific topics. Half of them focus on Hong Kong and Chinese culture such as historical figures, historical buildings, stories, and festivals. While traditional customs and beliefs are rapidly disappearing in a global environment of Hong Kong, fewer teenagers and even adults have good understanding of traditional culture. In order to preserve traditional culture, games are used to attract young people's attention. This section also includes games that focus on existing customs such as food culture and public transport.

Game	Subject	Target Users	Platform	Developer
ABCs Jungle Math	Math training	3+ years old	Android	YSD.hk
Reading Town 1	Literacy	3+ years old	Android	Hong Kong Education City
智多多公平派對 (Little Smart Justice Party)	Justice	3+ years old	Web-based	Independent Commission Against Corruption
Honest Classroom	Honesty	3+ years old	Web-based	Independent Commission Against Corruption
Pre-writing Fun Journey	Writing	3-6 years old	iOS	Heep Hong Society
Learning Flash Card	Item recognition	3+ years old	iOS	Learning App www.myschool.hk
学习角 (Learning Corner)	Mathematics	3+ years old	Authorware	Mary Rose School
Pre-writing Fun Journey	Pre-writing skills	3-6 years old	Android, iOS	Heep Hong Society

Table 5: Serious games for preschool education.

Serious games designed for children's and youth education

Both Hong Kong Government and private companies have shown strong interest in developing educational games for children and young people. We divide the overall 49 games according to 6 topics: music, language learning, preschool education, primary

education, technology, and science education. Games for preschool education (8, see *Table 5*) and primary school education (20) range from subjects such as math, reading and writing to environmental protection and moral education.

Due to Hong Kong's regional and colonial history as well as current political and cultural influences, children commonly learn three languages (Cantonese, Mandarin and English). Accordingly, language learning is one of the most prominent topics among children's and youth education games. 11 games were collected for language learning, 8 of which are for English learning and three for Chinese.

Serious games designed for professional training

Only three games were identified being used as part of professional training. *'Leanenterprise' eeLearn* is an online game designed to equip apparel industry staff with skills and knowledge about lean manufacturing. *The Culture Reshape eeLearn* facilitates organization members, irrespective of their positions in the organizational hierarchy, to learn and recognize corporate core values. Finally, *Internet Security Awareness Programme* by Hong Kong Productivity Council is targeted to companies to help their staff to understand Internet security in their daily business operations.

Games for marketing and advertisement

The 80 games identified for marketing and advertisement include game-like and playful applications used in on-site marketing campaigns. Typically, such a campaign is located in a mall for a short period of time. For this very reason, it is likely that the number of such installations developed within a timeframe of ten years is significantly higher, but since there is little or no record of the games, they remain outside of this study. Only four games in this category are mobile games, while the rest are interactive installations. Some of the interactive installations include a feature for QR code scanning, however.

CONCLUSIONS

This paper presented a review of serious games made and used in Hong Kong during the past ten years. Around 300 games were identified and divided into categories based on their theme and educational goal. The review serves to suggest that digital games are taken as a worthwhile tool for education, training and awareness raising in Hong Kong. It also shows that even though very few games gain wider public visibility, the range of available games and interested parties is wide.

While digital games are known to be used in business and corporate training, our study does not identify any such games. Further research is needed for covering this area. We also see that advergaming category needs to be researched further in order to separate games from mere interactive installations. In respect to all listed games, further analysis is needed for studying the games themselves (genre, mechanics, specific educational goal, etc.), their use (target users, actual users, product lifetime, success of the game, etc.), and their development (game engine, team composition, funding, etc.). We are particularly interested to which extent game designers are involved in the design of these games and who are the people designing gameplay and mechanics for serious games in Hong Kong.

ACKNOWLEDGMENTS

ENDNOTES [1]

The last two searches were included because it was known games with this specific focus had been created.

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