Chen, W. et al. (Eds.) (2017). Proceedings of the 25th International Conference on Computers in Education.
New Zealand: Asia-Pacific Society for Computers in Education

JobStar Online: Game-Based Learning on Smartphones to Promote Youth Career Education

Toru FUJIMOTO[a*], Yuki FUKUYAMA[b], Satoko AZAMI[c] & Satoru KONNO[d]
[a]*Center for Research and Development of Higher Education, The University of Tokyo, Japan*
[b]*College of Arts and Science, The University of Tokyo, Japan*
[c]*Independent Learning Game Designer, Japan*
[d]*Switch Entertainment, Japan*
*tfujimt@he.u-tokyo.ac.jp

Abstract: Career education for the youth is a crucial social need and must be upgraded and made relevant to the current generation, to help the youth develop a positive attitude toward career development and prepare for emerging opportunities. Existing job search tools are not designed to change a job seeker's focus from current job opportunities to future possibilities. We sought to address this need while appealing to the contemporary youth's communication styles by developing and implementing an online smartphone game called JobStar Online. The game requires participants to analyze social issues and articulate future job needs. A formative user test was conducted to evaluate the impact of playing the game on participants. Results indicated that the game offered an engaging opportunity that enhanced social interaction and facilitated learning from other players. The instructional materials need refinement to help users become familiar with the game environment, but the game created a playful context for thinking about a serious topic and supported participants in practicing idea generation.

Keywords: Career education, educational games, serious games, game-based learning, smartphone game

1. Introduction

Social and environmental changes such as globalization, political conflicts, scientific and technological advances, and climate change influence our lives and significantly reshape today's job market. Computerization and automation technology have not only made our work more productive, but have also created new types of careers while eliminating others. For instance, careers in telemarketing, hand sewing, and watch repair are expected to disappear in the near future (Frey & Osborne, 2013). On the other hand, one study estimated that 65% of today's grade-school students could end up doing jobs that do not yet exist (Davidson, 2011). Various new careers have emerged recently, such as data science and website design. Although it is difficult to foresee future circumstances, career education for the youth is a crucial social need and must be kept up to date to prepare the youth for jobs of the future.

In Japan, various governmental initiatives to support youth career development have been carried out in schools and elsewhere. Improving career and vocational education in schools is considered a major concern (Ministry of Education, Culture, Sports, Science and Technology of Japan, 2011). Japan's Ministry of Economy, Trade and Industry (2013) has also taken steps to address industry sectors' human-resource needs.

Common approaches to this problem include holding a career education seminar with professionals as guest speakers, offering internships at local companies so that students can gain work experience, and hiring a career education coordinator to plan and implement education programs in conjunction with local businesses. These efforts offer rich sources of information that help young people think about their future professions, but they have tended to focus on matching the youth with current human-resource needs and do not necessarily consider ongoing social change and jobs of the future. They also tend to rely heavily on delivering information, through such formats as lectures and texts. Current job search techniques usually involve self-analysis activities, which tend to strengthen a job

seeker's views about current job opportunities rather than fostering an ability to envision future possibilities.

The present career development situation in Japan is not emotionally healthy for the youth. College students in Japan tend to experience high anxiety during their job search period. Many of them become depressed, and each year some even commit suicide (Otake, 2013). Hence, it is necessary to create more opportunities to help the youth build a positive attitude toward their career. We need to offer career development activities that are more casual and playful so that students can think about their future occupations more positively.

2. Game Development

2.1 Game-based Learning for Career Education

Game-based learning has been identified as an effective approach to making learning activities playful and engaging (Klopfer, Osterweil, & Salen, 2009). Several review studies have indicated that the number of researches on game-based learning has been significantly increasing in various fields and have provided positive outcomes in terms of different types of learning objectives such as knowledge acquisition, motivational improvement, and behavioral change (Connolly *et al*., 2012; Hwang. & Wu, 2012; Qian & Clark, 2016). Various career-focused games exist, such as the classic Game of Life, CV (Milunski, 2013), and Career Odyssey (Franklin Learning Systems, 2008). These games can provide players with useful life lessons that they may not have experienced previously (Canary, 1968), but they tend to treat jobs as stereotypical and unchangeable. Although game-based learning is considered a potentially useful tool for career education (Miller & Knippers, 1992), there has been little consideration of how it can be best used.

There have been a few attempts to use simulation games for the purpose of career guidance (Fukamachi, 2006, 2010), but again, these simulations have guided players to view existing jobs as their career models, rather than to think about emerging jobs that do not currently exist. To encourage the youth to think about their future more positively, we presumed that it might be more effective to engage them in a game-based activity that guides them to think "outside the box."

Although it has not applied a game-based approach, the Canadian Scholarship Trust (CST) Foundation has sought to develop more future-focused forms of youth career education. Its Inspired Minds Careers 2030 initiative provides a list, compiled by researchers and futurists, of jobs that may appear in the next 10 to 20 years (CST, 2014). To make young people think about future jobs, it is important to offer this type of information. One way to engage them in such reflection is to challenge them with a game-based activity.

2.2 A Career Education Card Game: JobStar—Create Your Star Job!

Based on these notions, we first designed a card game for career education, called JobStar—Create Your Star Job! to make career education more playful. The game is designed to be easily applied in a normal classroom setting and to engage students more positively and playfully in discussions of future jobs (Fujimoto, Fukuyama, & Azami, 2015).

The game package comprises 20 job cards, 21 event cards, and 16 industry cards. Each job card contains a generic job type such as "engineer," "designer," or "tour guide," with a brief description of the major roles associated with the job. The jobs were chosen based on information in publications and on websites that are widely known by the Japanese youth (Benesse, 2014; Murakami, 2003). Among the hundreds of possible careers, we selected relatively generic, popular jobs that are simple and applicable to many industries. The appropriateness of the selection was tested by means of field tests during development. The event cards illustrate issues and incidents considered likely to occur in the near future, such as "global economy," "national financial collapse," and "robotization." Finally, the industry cards describe major industries such as finance, information and communications, and healthcare. Table 1 lists the cards used for the game, and Figure 1 displays examples of card design.

Table 1: List of cards used in the game.

Job Cards	Event Cards	Industry Cards
Designer/artist	EdTech revolution	Farming, forestry, and fishing
Planner	Natural disaster	Healthcare and welfare
Researcher	Globalization	Energy development
Engineer	Massive tourist influx	Education and child care
Analyst/consultant	Spread of robots	Transportation and shipping
Trainer/coach	Shrinking and aging population	Telecommunications
Chef	Regional conflict	Manufacturing and production
Tour guide	Upward mobility of women	Tourism and food
Driver/pilot	Offices everywhere	Civil engineering
Doctor/nurse	Cyber society	Mass media
Athlete	National financial collapse	Finance
Scientist	Overreliance on fossil fuels	Government
Therapist	Major medical advances	Entertainment
Buyer/dealer/sales	Global warming	International and space
Writer	Food insecurity	Beauty and fashion
Programmer	Transportation revolution	Ceremonial and religion
Companion/communicator	Clean energy revolution	
Teacher/instructor	Smart cities	
Operator/technician	Major student influx	
Agent	Space colonization	
	Decline of rural areas	

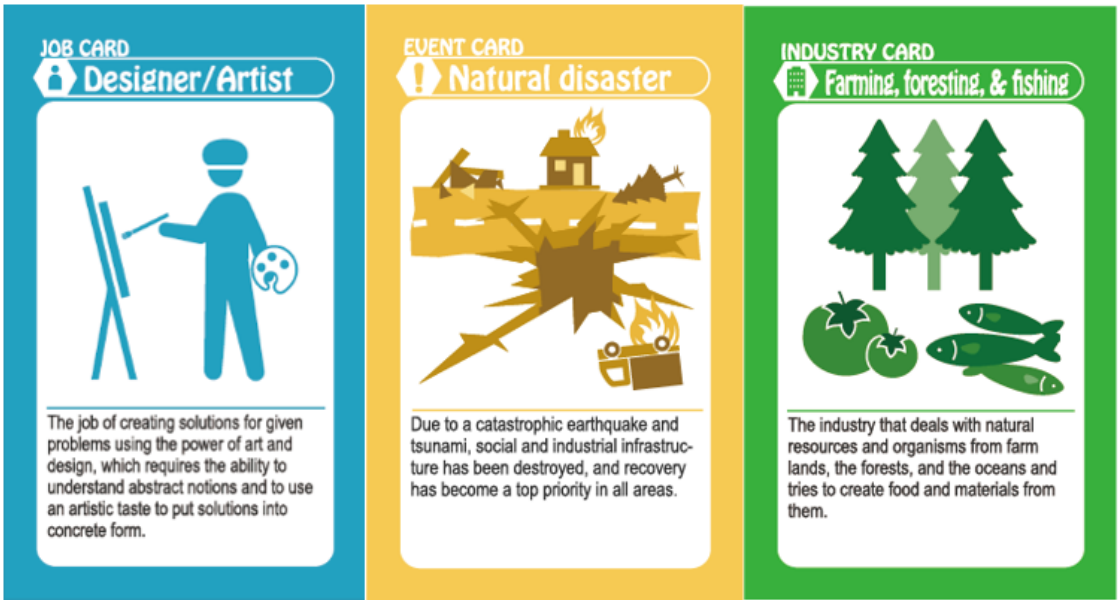

Figure 1. Card design examples from JobStar.

The game is designed for three to five players. During the game, players must come up with a unique job name, based on the job cards dealt to them, and develop a job profile and an explanation of how the job might be needed in a certain context in the future, as described on their event card and industry card. Through the game play, players need to conduct various learning activities such as observing the social context, comprehending the features of jobs, identifying the relevance between the target job and the social context, envisioning how the job can be effective in such a social context, and presenting the job description to other players in just a few minutes of gameplay. The new jobs created by players are the results of these higher-order thinking skills. While the information described in the cards assists players to perform these skills, players can also learn from other players during the play. Even if a player might not know how to play the game completely, he or she could get an idea quickly by going through a few game rounds.

The basic theoretical background employed in the game design is Bandura's (1997) social learning theory. Bandura conceptualized the characteristics of learning in a social context in terms of social modeling and vicarious learning. He emphasized the importance of surrounding oneself with other people when learning, as this brings another layer of meaning to the context. Peers learn from each other through interaction in various ways, such as observing a peer's actions or collaborating with peers. In this game, players are not only required to present their idea but also have to listen to ideas from others for several times. Although a player may be unable to comprehend a game initially, he or she can immediately play comfortably by looking at other players and following their example. Our game utilizes this advantage of playing games in a social context.

The other theoretical consideration is the notion of situated cognition (Brown et al, 1989). Instead of setting learning as a goal, the game is designed for playing with the knowledge on jobs and social contexts with other players. The game embeds a shared goal and challenges to make use of knowledge. Leaning occurs incidentally in the process of interaction with the game contents and other players. By engaging players in the playful activity, the game helps them to gain clearer images regarding jobs and reframe their thoughts on future career positively.

2.3 The Game Design of JobStar Online

Although the card-game version of JobStar was successfully implemented and the evaluation indicated that it could engage players, enhance social interactions, and facilitate participants' learning from each other, it faced the common limitation of analog games that it could be played only in a face-to-face setting. Although analog games offer various benefits, we believed that an online version could reach a broader audience and enable players to interact effectively regardless of their geographic location. Therefore, we redesigned the card game into an online version, JobStar Online.

The basic procedure of the game is as follows:

(1) At the beginning of the game, each player receives an event card, an industry, and five job cards, assigned at random.

(2) The player looks at his or her hand and considers what type of job will be needed in that industry if the event described on the selected event card should occur. The player must come up with a new job type based on one of the job cards he or she is holding. For example, if a player has received the "Shrinking and aging population" event card and the "Transportation and shipping" industry card, he or she would have to imagine a society in which increasing productivity has become an issue for that industry due to the decreased number of young workers.

(3) After the player has developed an idea for a new type of job in the selected industry, he or she types in the definition and significance of that job in the given context.

(4) After all players have submitted their job ideas, each player casts a vote for the best job created. The number of votes collected by each player represents the points gained in the session. As participants continue to play the game and gain points, they achieve higher levels (from 1 to 50) and receive titles such as Novice Job Creator or Star Job Creator.

The technological and design specifications of JobStar Online are as follows:

- The game was developed as a smartphone application available for Android OS and iOS using the Unity game engine. The main game server was built on cloud storage hosted by Amazon Web Services.
- Although the online version maintains the basic mechanics of the card game, it offers two modes of play, "Random Play" (single player) and "Live Event" (multiplayer). Players can choose the play mode on the main menu page (Figure 2).
- In Random Play, two different levels of difficulty (easy and normal) are offered so that players can practice and become accustomed to the rules at their own pace before participating in the multiplayer mode.
- In Live Event, players compete against each other synchronously, posting jobs for as many of their job cards as they wish within the time limit. When the session closes, players evaluate the entries and vote for the job card that they like best.
- An "Original Card Creation" option enables players to create their own original event and industry cards and share them with others.

- On the "My Note" page, players can review their play history and reflect on the cards they have created (Figure 3).

Figure 2. Screenshots of the game application.
Left: the main menu page; center: event status list page; right: live event page.

Figure 3. Left: play history page; right: example of a job created by a player.

While JobStar Online has the strength to reach many players, social learning elements that players appreciate in an analog game version's face-to-face setting is not evident. Therefore, we designed it to be playable individually at their disposal to substitute social learning elements with practice opportunity. Once players get accustomed to the game rule, they have an opportunity to learn by referring to the result of other players in multiplayer mode. My Note page is implemented to enhance

a reflective learning opportunity by looking through one's play history, which is difficult to offer in analog game version.

3. Evaluation

To examine the usability and the effectiveness of the game application, we conducted a formative user test in February and March 2017. Since the game application was still in the developmental phase, we evaluated it by setting up an actual play situation. We then used an online questionnaire to collect subjective feedback from the participants on the game's usability and their experience as players. The online questionnaire comprised 15 questions on a 5-point Likert scale (1 = not applicable, 5 = applicable) regarding how participants felt about the game, how their playing experience influenced their views regarding their future career opportunities, and their impressions of the application's usability. These questions were followed by four free-response questions permitting the participants to reflect in a more open-ended manner on the game.

Twelve participants (nine undergraduate students and three adults) were recruited with online advertisements through Facebook and Twitter. We instructed them via email on how to install the application on their personal smartphone and asked them to play the game on their own during a particular week. By collecting their game logs, we could understand how the game was played.

During the testing period, participants tried all the game functions implemented and posted the job cards created. Each participant spent between one and two hours playing, and 69 job cards were posted during the test period.

4. Results and Discussion

4.1 Impression of the Game Play

Four participants completed the online questionnaire. Even though this number was not adequate to achieve statistical significance, the results indicated that the game could provide participants with a valuable learning opportunity in some ways (Figure 4). All respondents viewed their game play experience positively as an opportunity to change their views about careers (Q5) and to learn from other participants through playing the game (Q6). Although they found playing the game to be difficult (Q2), they did not feel that it was like studying at school, and they expressed a desire to play more games like this one (Q10). Three of the four respondents found the game fun to play (Q1); similarly, three of four reported that they were able to think about future professions that their image of future careers had changed, and that they had gained a different way of thinking through playing the game (Q3, Q4, Q7).

The following open-ended comments from the participants represent their thoughts on how this game offered them a positive experience:

> It was great to understand the events likely to happen in the future while reading the cards. Also, it was nice to learn about various types of jobs. The remarkable thing was that instead of just letting players memorize this information, the game enabled us to understand new opportunities spontaneously during the intellectual activity of creating a new job. (Participant B-1)

> It was nice to think about future jobs and verbalize them. It was a good opportunity for me since I have been thinking that I should work on this kind of activity, but I could not have worked on it by myself. (Participant B-2)

> It was great to see the cards created by others. There were excellent ideas, and they made me think that I wanted to create better ones. (Participant B-3)

> After I created a convincing job card based on the context offered, I found that the job was really expected to come into existence. (Participant B-4)

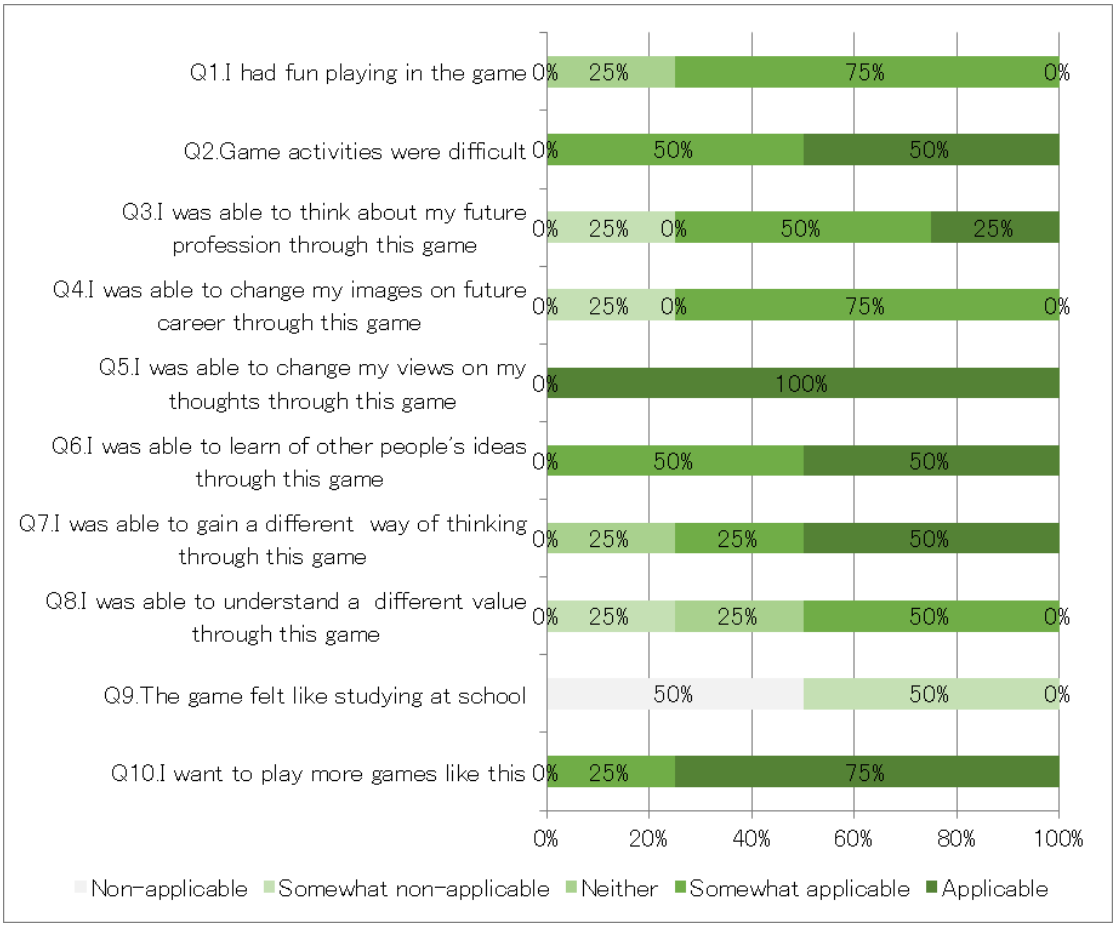

Figure 4. Feedback from the user test participants.

4.2 The New Jobs Created During Game Play

Players came up with various interesting new job ideas among the 69 job cards posted. For example, for the context of an aging society with a massive tourist influx, a participant created the job of "walk pacemaker," a tour guide who has expertise in healthcare and supports elderly people in maintaining a desired walking or running pace appropriate for one's health condition while engaging in tourism. Another participant created the career of "active senior coordinator," a tour coordinator for older people who is knowledgeable regarding local attractions and can stimulate the local economy by helping tourists to explore the best sightseeing spots. Table 2 provides additional examples.

Although players may simply be coming up with creative or even humorous ideas, their ideas could still stimulate other players to think differently. It should be noted that the game content might not strike players as entirely entertaining, as it involves serious social issues and information regarding job descriptions and industries, which are not significantly different from the contents of a social studies textbook. Moreover, thinking about jobs is not an immediate concern for all the youth; on the other hand, many are deeply worried about this issue because they have become familiar with painful and discouraging stories about job seekers through the news media. However, during the game, participants engaged playfully with others in thinking about future jobs and enjoyed their activity.

5. Conclusion

This paper has described the development and evaluation of a smartphone game for career education, JobStar Online. The user test indicated that the game could offer an engaging opportunity that enhances players' social interactions and enables them to learn from each other while playing. The survey results revealed that the game created a playful context for thinking about a rather serious topic that the youth

tend to be reluctant to consider. The game also supported participants in practicing idea generation and in presenting their ideas to others by promoting interaction among the participants, as the card-game version had done.

Table 2: Example of new jobs created.

Job title	Description	Context
Traffic safety analyst	Analyzes the use of public transportation by the elderly and reports to government officials on ways to improve national transportation policy	Aging society, transportation
Disaster recovery therapist	Psychiatrist or psychological counselor specializing in mental illness caused by experiencing serious disasters	Natural disaster, healthcare and welfare
Drone controller	Drone operator who specializes in maneuvering through an area affected by a natural disaster	Natural disaster, civil engineering
Astro therapist	Therapist who specializes in caring for specific issues faced by workers in outer space	Space colonization
Matchmaking negotiator	Helps the youth to find marriage partners in a rural area facing serious depopulation	Decline of rural areas

While this preliminary study indicated that the game might work well as a tool for facilitating constructive reflection on jobs of the future, it has a limitation in evaluation. Since our survey data were collected from a very limited number of participants in a formative assessment phase, the results do not provide conclusive evidence regarding the game's effectiveness for career education. Further research with a larger population would be required to understand the impact of JobStar Online on players. Future study would include a more extensive quantitative analysis on how players change their minds about their career after playing the game.

We intend to continue improving JobStar Online as a game-based career education tool that offers youth an opportunity to imagine their future path positively. After fixing the problems identified during the user test, we expect to release an updated version of the game through the Apple App Store and Google Play Store, aiming at distribution to a wide audience. Player data will be collected and analyzed continuously throughout the next phase of the study.

Acknowledgements

This study was partially funded by a research grant from the Hayao Nakayama Foundation for Science and Technology and Culture.

References

Bandura, A. (1997). Self-efficacy: The Exercise of Control. New York: W. H. Freeman.

Benesse (2014) Manabision. Benesse. [online] Retrieved on 25 January 2015 from: https://manabi.benesse.ne.jp/shokugaku/

Boocock, S. S. (1967). The life career game. *The Personnel and Guidance Journal*, *46*, 328-334. doi: 10.1002/j.2164-4918.1967.tb03191.x

Brown, J. S., Collins, A., & Dugid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18, 32-42

Canary, R. H. (1968). Playing the Game of Life. *The Journal of Popular Culture*, *I*, 427-432. doi: 10.1111/j.0022-3840.1968.0104_427.x

Connolly, T. M., Boyle, E. A., MacArthur, E. W., Hainey, T., & Boyle, J. (2012) A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education*, 59. 661-686.

C.S.T. Consultants. (2014) Inspired Minds Careers 2030. [online] Retrieved on 25 January 2015 from: http://careers2030.cst.org/
Davidson, C. N. (2011). Now You See It: How the Brain Science of Attention Will Transform the Way We Live, Work, and Learn. NY: Viking.
Franklin Learning Systems. (2008) Career Odyssey. Franklin Learning Systems.
Frey, C. B. & Osborne, M. A. (2013). The Future of Employment: How Susceptible Are Jobs to Computerisation? OMS Working Papers, September, [online] Retrieved on 25 January 2015 from: http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf
Fujimoto, T., Fukuyama, Y., & Azami, S. (2015) Game-Based Learning for Youth Career Education Using a Card Game 'JobStar'. Proceedings of The 9th European Conference on Games Based Learning. 203-209. Nord-Trondelag University College Steinkjer, Norway.
Fukamachi, T. (2006). Career simulation no kyouikutekikouka ni kansuru jikkenteki kentou (An experimental discussion on the educational effectiveness of career simulation). Discussion Paper 06-06. Roudou Seisaku Kenkyu-kensyuu kikou, [online] Retrieved on 30 July 2014 from: http://www.jil.go.jp/institute/discussion/2006/documetns/06-06.pdf
Fukamachi, T. (2010). Shugyou image rikai kouzyou no tameno career keisei shien program no kaihatsu (A development of career simulation program for assisting career development for the youth). Disucussion Paper 10-05. Roudou Seisaku Kenkyu-kensyuu kikou, [online] Retrieved on 30 July 2014 from: http://www.jil.go.jp/institute/discussion/2010/documents/DP10-05.pdf
Hwang, G. J., & Wu, P. H. (2012). Advancements and trends in digital game-based learning research: a review of publications in selected journals from 2001 to 2010. British Journal of Educational Technology, 43(1), E6-E10.
Klopfer, E., Osterweil, S., & Salen, K. (2009) Moving Learning Games Forward: Obstacles, Opportunities & Openness. MIT The Education Arcade. Cambridge, MA.
Maxis (2000) The Sims. Electronic Arts.
Miller, M. J. & Knippers, J. A. (1992). Jeopardy: A career information game for school counselors. *The Career Development Quarterly*, *41*, 55-61. doi: 10.1002/j.2161-0045.1992.tb00358.x
Milunski, F. (2013). CV. Granna.
Ministry of Education, Culture, Sports, Science and Technology of Japan. (2011). Chuou Kyouiku Shingikai Toushin: Kongo no Gakkou ni okeru career kyouiku-syokugyou kyouiku no arikata ni tsuite (Central council for education policy report: Future vision on career education and vocational education at school), [online] Retrieved on 25 January 2015 from: http://www.nier.go.jp/shido/centerhp/24career_shiryoushu/1-1.pdf
Ministry of Economy, Trade and Industry of Japan. (2013). Career kyoiku no naiyou no zyujitsu to fukyuu ni kansuru tyousa houkokusyo (Survey research report on the enhancement and diffusion of career education). Heisei 24 nendo sougou chousa kenkyuu, [online] Retrieved on 30 July 2014 from: http://www.meti.go.jp/policy/economy/jinzai/career-education/pdf/h24survey_honbun.pdf
Murakami, R. (2003). 13 sai no hello work (Employment Service Center for 13-years-old). Tokyo: Gentosha. Urakami, M (1994) A research on female students' transition from school environment to work environment-The influence of self-efficacy expectations on career decision making-. Japan Society of Youth and Adolescent Psychology, 6 40-49.
Otake, T. (2013). Job hunt stressing students, making them suicidal: poll. The Japan Times. [online] Retrieved on 30 April 2017 from: http://www.japantimes.co.jp/news/2013/10/18/national/job-hunt-stressing-students-making-them-suicidal-poll/
Qian, M. and Clark, K. R. (2016) Game-based Learning and 21st century skills: A review of recent research. Computers in Human Behavior. 63. 50-58.