

Effects of a gamified learning platform on elementary school students' flow experiences in leisure reading

Martin Ting Fung Mak

Hong Kong, China
martinmak@cantab.net

Meng Wang

Faculty of Education, University
of Hong Kong
Hong Kong, China
ann625@connect.hku.hk

Kai Wah Samuel Chu

Faculty of Education,
University of Hong Kong
Hong Kong, China
samchu@hku.hk

ABSTRACT

Reading is the basis of most learning but is regarded by students as a boring activity in Hong Kong. Therefore, schools in Hong Kong have launched different reading programmes to promote reading and one of the successful examples is Reading Battle which gamifies the reading comprehension assessments with points, levels, e-badges and leaderboard on an interactive learning platform. While many students first did it for external motivation such as getting more points and ranked high on the leaderboard, the study found that the heavy users of Reading Battle became committed to reading and many enjoyed the flow experiences where they seemed to forget about time and discomfort and truly enjoyed the reading process. This study looked into how gamification affected the flow experience of the students and discussed to what extent the nine flow dimensions were experienced by the students, especially the heavy users of the gamified learning platform. This case study chose 9 students from 4 different elementary schools in Hong Kong and adopted a mixed method such as questionnaires and interviews.

KEYWORDS

E-learning; Flow theory; Gamification; Mixed methods research; Reading motivation; Reading enjoyment

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Educational technology; Language learning

INTRODUCTION

To elementary school children, reading is always considered important and has been heavily promoted by schools around the world. Research from around the world has found out that children who read immensely and extensively excel in not only their reading abilities but also their academic performance (Anderson, Wilson, & Fielding, 1998; Cox & Guthrie, 2001; Cunningham & Stanovich, 1997; Moats, 1999). To increase students' motivation in reading, many schools launch reading programmes and among these programmes, one of them is an e-quiz platform called 'Reading Battle' (RB) (Wu et al., 2014). RB makes use of various game design elements to engage primary school students to read more books and answer questions about the

books read through post-reading activities. Research has shown that RB has been successful in stimulating students' reading motivation and interest, strengthening reading skills, and fostering self-directed learning (Chan, Chu, Mok, & Tam, 2016). Interestingly, many top achievers in that study in RB were first reluctant to read prior to the programme, but they were then committed to reading where they spent a long time carefully studying the books on RB to complete various kinds of challenges. The enjoyment brought by RB soon became an intrinsic motivation to read, and this has been demonstrated by the users who had 'flow experiences' (Csikszentmihalyi, 1990; 1998; 2014) which is an optimal psychological state in which 'people are so involved in an activity that nothing else seems to sheer sake of doing it' (Csikszentmihalyi, 1990, p.4). This present study examines how this gamified learning platform, Reading Battle, affects the users' flow experience in their leisure reading.

LITERATURE REVIEW

Gamification in education and Reading Battle

Deterding, Khaled, Nacke, and Dixon (2011, p. 1) define the term *gamification* as 'the use of game design elements in non-game contexts'. In other words, it is the 'intentional use of game elements for a game-like experience of non-game tasks and contexts' (Seaborn & Fels, 2015, p.17). Writing from an education perspective, Kapp (2012, p. 66) defines gamification as the use of 'game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems'. The learning platform, Reading Battle, is an example on how reading comprehension can be gamified to enhance students' learning and increase their motivation in reading. Similar to traditional reading programmes, RB provides a book list for students to read and to do the reading challenges. RB turns the reading tests into challenges by introducing various game elements such as points, e-badges, levels and leaderboard onto the learning platform and makes the paper-based reading worksheets into an interactive challenging system with immediate feedback for users. Hakulinen and Auvinen's report (2014) showed that gamified elements such as achievement badges can change students' learning

attitude. Other gamification literature (Barata, Gama, Jorge, & Gonçalves, 2013; de Byl & Hooper, 2013; Mitchell, Danino, & May, 2013; Leong & Yanjie, 2011) suggested that students deemed gamified courses to be motivating and engaging. This gamified learning platform has helped students internalise their external motivation such as getting more points and badges in RB into intrinsic motivation which can be understood by the flow theory.

Flow theory

Flow theory originates from an attempt to understand a phenomenon observed by the psychologist Mihaly Csikszentmihalyi in a longitudinal study of creativity conducted in 1960s (Getzels & Csikszentmihalyi, 1976). In this phenomenon, Csikszentmihalyi noted that art students often became so engrossed in their creative processes, such as painting and sculpting, that they tended to forget time and discomfort. Csikszentmihalyi (1990) characterized this phenomenon as intrinsically motivated or autotelic (i.e. auto = self, telos = goal), where the reward of pursuing an activity lies in the hands-on experience itself. In describing a flow experience, Csikszentmihalyi (1990) pinned down nine characteristics, which are also referred to as flow dimensions, namely, autotelic, goal clarity, challenge-skill balance, sense of control, concentration, immersion, feedback, knowledge improvement, social interaction. In the field of education, flow has been found in elementary students' self-sponsored writing process (Abbott, 2000; Gute & Gute, 2008), in secondary school's foreign language classroom (Egbert, 2003; Judge, 2011; Kirchoff, 2013), and in game-based learning (Buzady, 2017; Hamari et al., 2016; Inal & Cagiltay, 2007; Shernoff, Hamari, & Rowe, 2014). Similarly, top achievers in Reading Battle demonstrated a flow experience brought by this gamified learning platform.

AIMS & OBJECTIVES

To investigate the effects of a gamified learning platform on elementary school students' flow experiences in leisure reading, this study will answer two research questions:

1. Are there any major differences in the flow experiences between heavy users and light users on a gamified learning platform?
2. How does a gamified learning platform affect elementary school students' flow experiences in leisure reading?

METHODS

Participants

9 students in 4 different elementary schools in Hong Kong who completed challenges of more than 60 books on RB within 5 months (across 2 school terms) from 2017 to 2018 and scored an average of 80 points or more per book were identified as the 'heavy users'. Another 17 students from those schools with comparable school grades but with records of completing just one book in RB within the same time frame were chosen as the 'light users'. It would be ideal to have the same number of heavy and light users, but based

on the criteria in selecting participants, only 9 heavy users could be identified.

Research Methods

To answer the two sub-research questions, a mixed method with both quantitative and qualitative research methods was applied in this study (Creswell & Clark, 2017). Both the heavy users and light users were invited to participate in semi-structured interviews. The interview questions were written based on the flow theory (Csikszentmihalyi, 1990) and the EGameFlow (Fu, Su, & Yu, 2009) model. In the interview, items were divided into 9 sections with each section corresponding to a dimension of flow experience including autotelic, goal clarity, challenge-skill balance, and others. Students responded to the questions using a 5-point Likert scale regarding their experiences in leisure reading. As a semi-structured interview, open-ended follow-up questions were asked if necessary. To answer the second sub-research question, heavy users were also asked to self-report their flow experiences before and after joining RB as they had the most exposure to the gamification platform. All the interviews were done at the end of the 5-month programme.

RESULTS

Differences in flow dimensions between heavy users and light users

The following table shows the flow experience reported by both heavy-user and light-user groups.

Flow dimensions	Heavy users (n = 9)		Light users after joining for at least 2 school terms (n = 17)	Sig. Wilcoxon Signed Ranks ^a	Sig. Mann-Whitney ^b
	Before joining RB	After joining for at least 2 school terms			
Autotelic	4.00	4.63	4.16	0.017*	0.121
Goal clarity	3.59	4.19	3.82	0.024*	0.310
Challenge-skill balance	3.70	4.04	3.90	0.041*	0.495
Sense of control	3.93	4.22	4.18	0.057	0.869
Concentration	3.70	4.37	4.16	0.034*	0.891
Immersion	3.33	4.16	3.87	0.041*	0.254
Feedback	3.19	4.22	3.75	0.011*	0.146
Knowledge improvement	3.85	4.78	4.35	0.027*	0.037*
Social interaction	3.19	3.85	3.65	0.028*	0.604

a. Mann-Whitney Test: HU group versus LU group after joining RB for at least two school terms

b. Wilcoxon Signed Ranks Test: Heavy-User group before versus after joining RB for at least two school terms

* Statistically significant at $p < 0.05$

Note: In the 5-point Likert scale, 5 means students experienced the most flow and 1 being the least.

Table 1. The flow experience reported by both heavy-user group and light-user group

Overall, statistical analysis indicated that RB could significantly help students in heavy-user group (HUs) achieve flow in leisure reading on all dimensions ($p < 0.05$) with the exception of 'Sense of control' ($p = 0.057$). Before joining RB, HUs could only partially achieve flow on every dimension (total rating 3.01 - 4.00). After using RB on a regular basis for at least two school terms, students could achieve flow on every dimension in high level bracket of ratings (total rating 4.01 - 5) with Social Interaction (at 3.85) an exception. On the contrary, students from Light-User group (LUs) could achieve flow on four dimensions which were Autotelic, Sense of control, Concentration and Knowledge improvement.

Effects of RB on flow dimensions experienced by heavy users

To further investigate how the heavy users experienced flow in leisure reading, qualitative data were also collected during the interviews.

(1) Autotelic

Students reported in the interview that they had a genuine interest in reading books in both Chinese and English, and now they enjoyed their leisure reading more after their participation in RB. According to Csikszentmihalyi and Nakamura (2014), people need some kind of external goals as a motivation to start performing an activity. 'With time, these goals might become intrinsic to the activity itself' (Csikszentmihalyi, 1990, p. 130). In addition, students developed a real passion in learning the two languages, one student (LTT_YYX) said 'By doing the questions in RB, I can learn more Chinese idioms'.

(2) Goal Clarity

In interviewing students, LTT_QEL pointed out that her goal was to 'compete with others' and to 'get points', but she eventually 'realised that participating in RB was not just about competing with others... [one] should enjoy the book'. Furthermore, students identified their goals in improving their literacy skills. For example, LTT_WGZ said 'I didn't know any benefits from reading leisure books; but now I have read a lot, my goal was to increase my vocabulary'. Students transformed their goals from external motivation into intrinsic motivation and experienced flow as a result.

(3) Challenge-skill balance

It was reported by most of the students that the levels of reading on RB could help them adjust to the appropriate level of challenge. As RB provided a levelled book list to students, students could find books suitable for their reading level (FSI_YZX). In order to find the most suitable level of appropriate challenge for themselves, students needed to proactively try the books on the book list. This challenge, in Csikszentmihalyi's words (1990, p.128), was a 'stimulus that attracts our attention, and demands some response on our part.' Students challenged themselves to an appropriate level and eventually made progress academically.

(4) Sense of control

RB promoted the idea of students taking an initiative to challenging themselves to read books from a higher level. LTT_YYX said, 'Before using RB, all I read were easy books. Now, I spend all my free time on reading, RB books seemed very interesting to me'.

(5) Concentration

One feature in flow experience is the psychological state that one tends to forget time and discomfort. Students were more focussed and their concentration level increased because they could enter an imaginary world brought by the novels. LTT_YYX said, 'When I read, sometimes I feel as if I had entered the imaginary world brought by the book... and because I was focussed, I would not be easily distracted'.

(6) Immersion

Similar to concentration, three students (LTT_YYX, FSI_YZX, LTT_WGZ) reported that they paid so much attention that they felt as if they were 'immersed' in the world created by the novels. Furthermore, students stated that the level of immersion corresponded to the level of understanding of the story. The better they understood story, the easier they could feel that they were part of the story.

(7) Feedback

One of the prominent features of RB is that it gives students immediate feedback to their answers. Those feedback were usually the hints of where students could re-read the book and find out the answers on their own. In interviewing students, they really appreciated this feature and found that it was particularly useful. HCY_SRZ stated, 'If my answer was wrong, RB would give me hints about which pages of the book that I should read more carefully'. This promoted self-learning and their skills were developed as a result of the immediate feedback.

(8) Knowledge improvement

Extensive reading developed students' language skills and knowledge of the world and this was reflected in the improvement in their academic performance. LTT_YYX said that 'my academic performance has improved as I read more books'.

(9) Social Interaction

Although the score in Table 1 for social interaction is not that high, students reported quite a few features of how RB has promoted their social interaction. LTT_YYX asked for help from their family members and friends when they encountered anything they did not understand. LTT_YYX would also share their recommendations of the books with their classmates and friends who also participated in RB.

CONCLUSION & IMPLICATIONS

In conclusion, the findings in this study showed that the gamified learning platform did make a difference in bringing students a better flow experience in all nine dimensions and students had a higher level of intrinsic motivation regarding reading after their participation in RB. Although the sample size was quite small in this study which only have an

indicative value, this has a huge implication in the context of education, especially in Hong Kong. As mentioned in the introduction, traditional ways of reading have always been regarded as tedious and boring and students do not enjoy reading as much as they should. Therefore, to make reading interesting again, a gamified platform seems to be one of the solutions. Through an interactive platform with game elements, students can eventually discover the joy of reading and truly enjoy the reading process. Rather than assigning homework and reading tests, students take the ownership of their learning and read for joy.

REFERENCES

- Abbott, J. A. (2000). "Blinking Out" and "Having the Touch", "Blinking Out" and "Having the Touch": Two Fifth-Grade Boys Talk about Flow Experiences in Writing, Two Fifth-Grade Boys Talk about Flow Experiences in Writing. *Written Communication*, 17(1), 53–92.
- Anderson, R. C., Wilson, P. T., & Fielding, L. G. (1988). Growth in Reading and How Children Spend Their Time Outside of School. *Reading Research Quarterly*, 23(3), 285–303.
- Barata, G., Gama, S., Jorge, J., & Gonçalves, D. (2013). Improving participation and learning with gamification. *Proceedings of the First Intl. Conference on Gameful Design, Research, and Applications*, 10–17. ACM.
- Buzady, Z. (2017). Flow, leadership and serious games - a pedagogical perspective. *World Journal of Science, Technology and Sustainable Development; Brighton*, 14(2/3), 204–217.
- Chan, M.Y.H., Chu, S.K.W., Mok, S.W.S. & Tam, F. (2016). *Fostering Interest in Reading and Strengthening Reading Comprehension Ability of Primary School Students Using a Children's Literature E-quiz Bank on the Cloud*. Paper presented at Social Media 2016, The International Education and Technology Conference, Hong Kong.
- Cox, K. E., & Guthrie, J. T. (2001). Motivational and Cognitive Contributions to Students' Amount of Reading. *Contemporary Educational Psychology*, 26(1), 116–131.
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). LA: SAGE Publications.
- Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience* (1st ed.). NY: Harper & Row.
- Csikszentmihalyi, Mihaly (1998). *Finding Flow: The Psychology of Engagement With Everyday Life*. New York: Basic Books.
- Csikszentmihalyi, Mihaly (2014). *Flow and the Foundations of Positive Psychology: The Collected Works of Mihaly Csikszentmihalyi*. Dordrecht: Springer.
- Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J. (2014). Flow. In M. Csikszentmihalyi, *Flow and the Foundations of Positive Psychology* (pp. 227–238). Dordrecht: Springer Netherlands.
- Cunningham, A. E., & Stanovich, K. E. (1997). Early Reading Acquisition and Its Relation to Reading Experience and Ability 10 Years Later. *Developmental Psychology*, 33(6), 934–945.
- de Byl, P. (2013). Factors at Play in Tertiary Curriculum Gamification. *Intl. Journal of Games-Based Learning*, 3, 1–21.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From Game Design Elements to Gamefulness: Defining Gamification. In *Proceedings of the 15th Intl. Academic MindTrek Conference: Envisioning Future Media Environments, MindTrek 2011* (Vol. 11, pp. 9–15).
- Egbert, J. (2003). A Study of Flow Theory in the Foreign Language Classroom. *Modern Language Journal*, 87(4), 499–518.
- Fu, F.L., Su, R.C., & Yu, S.C. (2009). EGameFlow: A scale to measure learners' enjoyment of e-learning games. *Computers & Education*, 52(1), 101–112.
- Getzels, J. W., & Csikszentmihalyi, M. (1976). *The creative vision: a longitudinal study of problem finding in art*. NY: Wiley.
- Gute, D., & Gute, G. (2008). Flow Writing in the Liberal Arts Core and Across the Disciplines: A Vehicle for Confronting and Transforming Academic Disengagement. *JGE: The Journal of General Education*, 57(4), 191–222.
- Hakulinen L. & Auvinen T. (2014). The Effect of Gamification on Students with Different Achievement Goal Orientations. *2014 Intl. Conference on Teaching & Learning in Computing and Engineering*, 9–16.
- Hamari, J. et al (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, 54, 170–179.
- Inal, Y., & Cagiltay, K. (2007). Flow experiences of children in an interactive social game environment. *British Journal of Educational Technology*, 38(3), 455–464.
- Judge, P. B. (2011). Driven to read: Enthusiastic readers in a Japanese high school's extensive reading program. *Reading in a Foreign Language; Honolulu*, 23(2), 161–186.
- Kapp, K. M. (2012). Games, Gamification, and the Quest for Learner Engagement. *T+D*, 66(6), 64–68.
- Kirchhoff, C. (2013). L2 extensive reading and flow: Clarifying the relationship. *Reading in a Foreign Language*, 25(2), 192–212.
- Leong, B., & Luo, Y. (2011). *Application of Game Mechanics to Improve Student Engagement*. Presented at the Proceedings of Intl. Conference on Teaching and Learning in Higher Education.
- Mitchell, N., Danino, N., & May, L. (2013). Motivation and Manipulation: A Gamification Approach to Influencing Undergraduate Attitudes in Computing. *European Conference on Games Based Learning; Reading*, 394–400.
- Moats, L. C. (1999). *Teaching Reading Is Rocket Science: What Expert Teachers of Reading Should Know and Be Able To Do*. American Federation of Teachers, AFL-CIO, 555 New Jersey Ave.
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *Intl. Journal of Human-Computer Studies*, 74, 14–31.
- Sherhoff, D., Hamari, J., & Rowe, E. (2014). Measuring flow in educational games and gamified learning environments. In *EdMedia: World Conference on Educational Media and*

Technology (pp. 2276–2281). Association for the Advancement of Computing in Education (AACE).

Wu, W. W. Y., Chu, S. K. W., Chan, H., Wong, J., Tse, S. K., Tavares, N., & Mok, S. W. S. (2014). *Strengthening students' reading comprehension ability (both Chinese and English) through developing children's literature equiz bank on the cloud*. Presented at the The 19th Intl. Education and Technology Conference, HK, China.