Design and Preliminary Evaluation of an Educational Board Game on Urban Culture and History with Mobile Conceptual Scaffolding

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Abstract: With the development of urbanization, local towns are at risk of losing their local culture as a result of out-migration. Local literature and history education is limited by time and teachers' qualifications. In this study, we designed a board game "Walking on Puzi Street" to assist students' learn local history and culture by combining scaffolding on the cards with the mobile conceptual scaffolding provided from the mobile app. Learners take on the role of a tour guide, leading travelers on a tour of the town of Puzi in Taiwan. The preliminary study investigated participants' flow, acceptance and sense of place. The results showed that the game mechanism can engage learners in the game, facilitate local literature and history learning, and bring them sense of interest in the place. Also, high rates of learners used mobile scaffolding.

Keyword：local history, educational board games, mobile scaffolding, conceptual scaffolding

1. Introduction

Communities or places are important starting points for understanding oneself and one's surroundings (Mclnerney, smyth, Down, 2011), and Taiwan is facing the effects of issues such as urban-rural development imbalance and policies that emphasise place-making (Executive Yuan, 108). However, a lack of relevant teaching aids and students' motivation to learn about such topics is critical. (Halvorsen, Harris, Doornbos, Missias, 2021). Therefore, this study designed a board game, " Walking on Puzi Street " for learners learning local knowledge and history. Study has found that game-based learning can significantly enhance learners' intrinsic motivation (Tüzün, 2009). " Walking on Puzi Street" is a local tourism game in which players as tour guides from a travel agency in Puzi lead tourists to destinations that match their ideal preferences. Through the tourist cards (Figure 1), players can learn about 1 to 3 features that the tourists wish to visit. The closer the destination cards align with the tourists' descriptions, the higher the favor score (points) awarded to the players. Lin et al. (2023) assert that learners benefit from appropriate support when facing challenges. The game incorporates two types of conceptual scaffolding: information provided on the cards and QR codes as scaffolds during the game (Figure 2).Players receive partial information about the attractions from the destination cards, serving as conceptual scaffolds on the cards, and use this information as clues for guiding tourists to their destinations (Figure 3) on the game board. Additionally, players can obtain extended information related to solving key puzzles by scanning QR codes, providing real-time action scaffolding with detailed content about the attractions. The mobile conceptual scaffolding also allows players to learn about the historical stories of the attractions. The primary objective of this research is to conduct a preliminary analysis of learners' flow experience, sense of place, learning performance, and acceptance within the game, while observing learner behaviors.

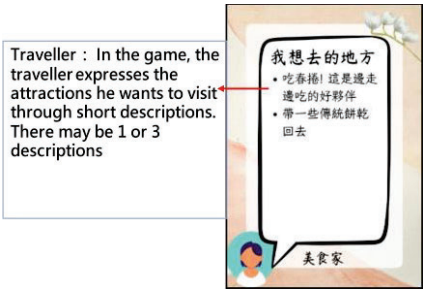

Figure 1. Tourist cards

Figure 2. Destination cards

Figure 3. Actual Gameplay

2. Methodology

A total of 21 participants, aged 20 years old or above, were randomly divided into groups of 3-4 to play board games. Pre- and post-testing designs have been approved by local historians. The Flow Scale designed by Kiili (2006) translated and revised by Hou & Li (2014) was referred to in this study. The reliability of the flow questionnaire (Cronbach's alpha=0.876) indicated a high degree of internal consistency. In terms of acceptance, this study adapted the acceptance scale proposed by Davis (1989), which also had high internal consistency in terms of reliability (Cronbach's alpha = 0.857). The Sense of Place Scale was modified with the Tourism Purpose Scale designed by Abou-Shouk & Zoair et al. (2018), with a high degree of internal consistency in reliability (Cronbach's alpha = 0.943). The total game activity time is 120 minutes, including game activity flow description (10 minutes), pre-test (20 minutes), game teaching (10 minutes), game play (50 minutes), and post-test and questionnaire completion (30 minutes).

3. Results

The Wilcoxon signed-rank test was employed to analyze the difference between the pre and post-tests (Z=-3.734, p<0.001) shown as Table 1. The post-test was significantly higher than the pre-test, indicating that the game enhanced the learners' learning *knowledge of local history*. Table 2 shows the learners' *flow, acceptance, and sense of place*. Overall *flow* (M=3.86, SD=0.53) was significantly higher than 3 (the median of scale) (Z=3.98, p<0.001). The mean values of the *flow antecedent* and *experiences* for each sub-dimension were significantly higher than 3. Acceptance results showed that usefulness, ease of use, and game design elements were all significantly above 3. The sense of place results showed that only recreational activities of sense of place higher than 3. In addition, observations data revealed that 17 out of 21 participants (81%) used the mobile scaffolding during the game.

Table 1 *Statistical Analysis of Learning Performance*

post-test(N=21)		pre-test(N=21)			
M	***SD***	***M***	***SD***	***Z***	***p***
53.1	13.74	34.29	14.6	-3.734***	.000

****p< 0.001*

Table 2 *Flow, Game Acceptance, Sense of Place Descriptive Statistical Analysis*

Dimensions	***M***	***SD***	***Z***	***p***
Overall Flow	3.86	0.53	3.98***	.000
Flow Antecedent	3.86	0.55	3.9***	.000
Challenge-skill balance	3.86	0.71	3.46**	.001
Goals of an activity	4.29	0.58	3.96***	.000
Unambiguous Feedback	4	0.71	3.62***	.000
Sense of Control	4.07	0.97	3.4**	.001

Action-awareness Merging	3.07	0.95	0.19	.852
Flow Experience	3.86	0.65	3.65***	.000
Concentration	3.99	0.83	3.56***	.000
Time distortion	3.54	1.12	2.03*	.042
Autotelic experience	4.19	0.68	3.83***	.000
Loss of self-consciousness	3.26	1	1.27	.203
Overall Acceptance	3.96	0.61	3.95***	.000
Perceived Usefulness	4.05	0.77	3.61***	.000
Perceived Ease-of-use	4.06	0.8	3.66***	.000
Game Design Elements	3.84	0.73	3.56***	.000
Overall Sense of Place	3.25	0.71	1.58	.114
Place attachment	3.13	0.71	0.94	.349
Expressive attachment	3.32	0.87	1.72	.086
Recreational activities	3.52	0.87	2.3*	.022
Tourist satisfaction	3.13	0.89	0.77	.439
Intentional revisit	3.21	0.89	1.44	.15

*p< 0.05, **p< 0.01, ***p< 0.001

4. Conclusion

In this study, an educational game "Walking on Puzi Street", which integrates cards and mobile conceptual scaffolds to help students learn local history and culture. The results revealed that the game is helpful to understand of local culture and history, easy to operate and entertaining in terms of sense of place. Finally, the game may help players to understand local literature and history. In the future, design the game to promote sense of place and comparing more learners' learning experiences between traditional tour group are needed.

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