Applying virtual stories to enhance University students' learn-to-learn competence for practicum preparation: an empirical exploratory study

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Abstract—Though considerable literature conducted in the context of Western societies has concluded that the use of virtual reality (VR) technology can facilitate students' learning, the applicability of this technology to advancing students' practicum learning in the Chinese context remains uncertain. This presentation describes the design and implementation of a learning project based on the pedagogical foundation of learning-to-learn and the application of VR technology. The extent to which the project intervention can enhance students' learn-to-learn competence (i.e. creativity, professional identity and teamwork skills) was assessed through a longitudinal survey study. ANOVA analysis was conducted based on the data collected at three time points (pre-intervention, post intervention and follow-up stages) on a group of 107 University students. Results indicate significant positive changes among student participants in their self-perceived creativity, teamwork skills and the accomplishment of course intended learning outcome. Issues and implications for University education in the digital and the COVID-19 pandemic era are discussed.

Keywords—Learning to learn strategy, virtual reality, tertiary education Introduction

Introduction

Learn-to-learn principles

Arie de Geus, a business theorist, argued that "*the ability to learn faster than your competitors may be the only sustainable competitive advantage*" in the job market (cited in p.98, [1]). Furthermore, "with increasingly rapid changes in the workplace, in part due to changing technology and as a result of changing societal needs in the context of globalization, citizens must learn to learn in order that they can maintain their full and continued participation in employment and civil society or risk social exclusion" (p.5, [2]). Therefore, strengthening students' learning-to-learn (L2L) ability has been prioritized in higher education globally for almost two decades.

L2L is defined as "the ability to pursue and persist in learning, to organise one's own learning, including through effective management of time and information, both individually and in groups. This competence includes awareness of one's learning process and needs, identifying available opportunities, and the ability to overcome obstacles in order to learn successfully" (p.16, [3]). In addition, L2L is understood as "the ability to engage consciously, intentionally, and profitably with new learning opportunities, throughout the life span and to purposefully negotiate a pathway through a range of options, managing, interpreting, and re-constructing complex data and relationships in order to achieve personally appropriate and publicly recognized goals" (pp.69-70,[4]). Key elements of L2L include aspiration, self-awareness, curiosity, and vulnerability [1].

Deakin-Crick (2014), in her review of the literature on L2L, identified five distinctive processes of lifelong learning: (1) forming a learning identity and purpose, (2) developing learning power, (3) generating knowledge and know-how, (4) applying learning in authentic contexts, and (5) sustaining learning relationships (p.70, [4]). Considering that it is unlikely to get students to experience all five of these processes under this project's time constraints and scale, the current project will focus on forming a learning identity for students, sustaining learning relationships among students across and within disciplines, and developing some aspects of learning power in students' practicum activities.

Virtual reality technology and peer-to-peer learning

VR-technology has been demonstrated to improve education and training for years [5, 6, 7]. For instance, VR helps social work students build an awareness of their professional identities through their practical engagement with diversity and difference [8]. VR offers an immersive learning environment in which students educate themselves within a structured programme of self-directed courses [9]. In addition, VR can offer a time machine effect (www.virtualitech.com), through which learners can experience future professional events. In this context, learners are motivated to learn because they can foresee the benefits (perhaps in the future) from their here-and-now learning and can connect their learning with their life goals. In this project, students will be provided an

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immersive scenario of their future careers in which they encounter some of the challenges and rewards from their professions. Then, they will be guided to connect their future and current selves, which lets them become aware of their current learning needs.

P2P encourages active learning, autonomy, and social support, which are all necessary for developing an intrinsic motivation to learn [10]. More importantly, P2P initiatives facilitate L2L principles. Learning relationships in a community of practice are regarded as facilitating identity formation, developing learning power, sustaining knowledge generation, and enhancing competence ([4]. In this project, a learning community will be formulated that engages social sciences and sciences students in co-constructing and disseminating knowledge and skills through face-to-face or online forums. For example, students from computer sciences can prepare a mini lecture on big data skills while social work students offer a demonstration of rapport building in workplace, and these projects are made available for online viewing through YouTube. In the short run, this kind of cross-disciplinary knowledge sharing can equip students for their practicum training. In the long term, this kind of learning network can pave the way for inter-professional collaboration in the future.

Project "Aspiration"

This is an 18-month teaching and learning project that is intended to incorporate the key L2L components (e.g., aspiration, learning identity, learning relationships, and creativity) in a series of activities for preparing students in their coming practicum. Through the "real world" and the "digital world," we have accommodated more than 200 students (56% female and 44% male) across two disciplines (social work and computer sciences) and 50 practicum supervisors between 2020 and 2021. The key pedagogical components were delivered as follows:

L2L workshop for practicum supervisors. Around 50 practicum supervisors attended a training workshop of learn-to-learn education that covered the origins, development, components of L2L approach and its application in practicum supervision. The supervisors following their attendance were expected to be more confident in (a) motivating students to take ownership of their own learning with reference to their perceived professional identity in the VR experience, (b) encourage students to make use of their creativity and learning relationship throughout the practicum period, and (c)incorporating L2L principles in assignment and assessment in practicum.

L2L through VR stories. A collection of 8 VR clips were produced for COMP and APSS students to experience their future career lives under the guidance of project staff. (see Figure 1). The VR clips took the students to the year 2025 where they could experience their future career lives. On a given working day in 2025, they may encounter a number of work challenges as well as career satisfaction (professional identity). More importantly, they got the opportunities to discuss with the project staff on how to deal with the challenges with their innovativeness, for example the life-and-death issue (see https://www.youtube.com/watch?v=eMOAuwPnuxc). A user manual covering equipment requirements, scenarios, and "Dos" and "Don'ts" during the VR training will be available. To address concerns regarding the accuracy of the VR scenarios depicted in the scrips, out research team members took site visits to different social work service units and formed an expert group composed of current social workers and professionals in computer sciences who met periodically to offer comments on the script.

P2P Online seminars. Learning community is emphasized in L2L education. Therefore, promoting peer-to-peer learning (P2P) is one the key elements of this project. In doing so, a training workshop was provided to students on the skills of conducting online seminars. At the end, 10 of these online seminars (10-15 mins each) are available online through YOUTUBE in an *asynchronous* manner that aim at sharing knowledge, skills, and wisdom relevant to the fieldwork practicum (see Figure 2). Topics include "ice-breaking", "rapport building in workplace", "conflict management", "stress management", "coding", "gaming", "use of VR technology", "showing empathy", "time management", "online social work intervention", and "getting along with practicum supervisor" . One innovative example can be been seen via https://www.youtube.com/watch?v=eoft5sixs68

Figure 1. L2L VR videos

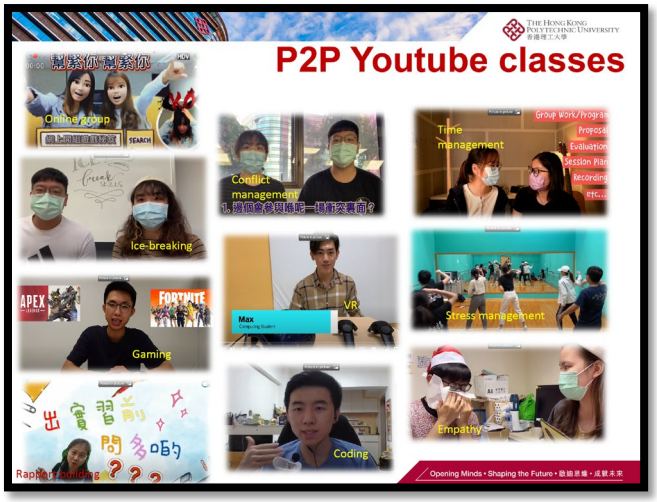

Figure 2. P2P online seminars

This learning project aims to design and implement a series of activities for preparing students for the first fieldwork placement based on three key L2L components: professional identity, teamwork skills, and creativity. A quasi-experimental design was used to evaluate the project with the following hypotheses:

***Hypothesis 1*:** Participants in the intervention group would have improvement in L2L competences (i.e., self-perceived creativity, teamwork skills, and professional identity) after the program.
***Hypothesis 2*:** The participants in the intervention group would have more advancement in the L2L competences than the participants in the comparison group.
***Hypothesis 3*:** The participants in the intervention group would have higher rating on the learning outcomes of practicum training than the participants in the comparison group.

Method

Study design and sample

Of 249 students registered for this project, 206 attended all activities, and 200 returned their valid responses in different waves of survey studies. Demographic information for both groups is summarized in Table 1. Both intervention and comparison groups had a gender balance (51% female, intervention; 62% female, comparison), with most students aged below 25 (65%, intervention; 52%, comparison). In the current study, the repeated measure analysis of variance (ANOVA) was used to examine the between-subject changes among the intervention group (n = 107) and the comparison group (n = 93) over two time points (T1 and T3) and the within-subject changes of the intervention group over three time points (T1, T2, and T3). With the assistance of G*Power, the current project set the effect size (f^2) to be .25, αerror probably to be .05, power for the F test to be 95%, thus the minimum required total sample size was calculated to be 158. A sample of 200 is well justifiable.

Table 1. Demographic characteristics (N=200)

	All (N=200) %	Intervention Group (n=107) %	Comparison Group (n=93) %
Gender			
Female	56	51	62
Male	44	49	38
Age group			
Below 20	18	18.7	17.2
20-24	41	46.7	34.4
25-29	29	23.4	35.5
30-34	80	9.3	6.5
35-39	2.5	1.9	3.2
40 or above	1.5		3.2
Mode of study			
Full-time	58.5	63.6	52.7
Part-time	41.5	36.4	47.3
Program			
BASW	34	32.7	35.5
COMP	24.5	36.4	17.2
MSW	41.5	30.8	47.3

Outcome Measure

A survey questionnaire was used to collect data at three time points from the intervention group and two time points from the comparison group. Within and between group differences in the four project outcomes were assessed:

Intended learning outcome. The first outcome variable is the perceived achievement of the intended learning outcomes of practicum. Respondents doing the social work program were invited to rate their performance in the practicum training on a five-point Likert scale (1=very poor; 2= poor; 3=fair; 4=good; 5=excellent) through questions, such as "articulate the basic knowledge, value, and attitude essential in fulfilling a variety of social work roles", "develop beginning competence in generic social work practice", and "gain awareness of a sense of social responsibility". Respondents from the computer sciences program were asked to answer the questions like "gain better understanding of computer practice so that better choices of electives and final year projects can be decided", "improve interpersonal and communication skills", and "relate academic principles to social and technical environments".

Professional self-identity. The second outcome variable is the respondents' self-perceived professional identity. Nine items were originally developed and validated by Adams and his associates (2006). In this study, respondents were asked to indicate their level of agreement (1=strongly disagree; 2= disagree; 3=neutral; 4=agree; 5=strongly agree) on the statements like "I feel like I am a member of this profession", "I can identify positively with members of this profession", and "I feel I share characteristics with other members of the profession". A Cronbach's α of .764 is indicated.

Teamwork skills. The third outcome variable is the respondents' self-perceived level of teamwork skills. Ten items of a validated scale were used[11]. Respondents were invited to indicate how far they agree (1=strongly disagree;

2= disagree; 3=neutral; 4=agree; 5=strongly agree) on the description of the circumstances like "I enjoy working in a team", "I know how to make team more effective", and "I contribute to the teams of which I am a member". This scale has a Cronbach's α of .818.

Creativity. This study also examined how far the participants 'creativity' (innovativeness) was enhanced following the learning project. Students were asked to rate their perceived efficacy on 13 items on a five-point Likert scale [12,13]from 1 = *strongly disagree* to 5 = *strongly agree*. Sample questions included 'I could be a good source of creative ideas', and 'I would often have a fresh approach to the problem'. A Cronbach's α of .905 reveals a high level of internal reliability.

Result

Within-group difference of intervention group

Creativity. Data indicate significant differences of mean scores (F (1, 106) = 9.91, p ≤. 01) across three time points, increasing from 3.39 (*SD* = 0.588) at T1, to 3.57 (*SD* = 0.601) at T2 and 3.59 (*SD* = 0.665) at T3. A moderate effect size (partial) η^2) indicating 8.6% of variance in scores is attributed to changes over time.

Professional identity. No significant difference of mean scores (F (1, 106) = 0.424, p = n.s.) across three time points. They are 3.72(*SD* = 0.542) at T1, to 3.61SD = 0.627at T2 and 3.69(*SD* = 0.602) at T3.

Teamwork skill. Data indicate significant differences of mean scores (F (1, 106) = 4.93≤. 05 across three time points, increasing from 3.48 (*SD* = 0.541) at T1, to 3.64 (*SD* = 0.603) at T2 and 3.62 (*SD* = 0.712) at T3. A small effect size (partial) η^2) indicating 4.4% of variance in scores is attributed to changes over time.

Perceived accomplishment of ILOs. Results of the study demonstrate significant differences of mean scores (F (1, 106) = 5.69, *p* ≤. 05) across three time points, increasing from 3.62 (*SD*= 0.532) at T1, to 3.70 (*SD* = 0.615) at T2 and 3.80 (*SD* = 0.760) at T3. A small effect size (partial) η^2) indicating 5.1% of variance in scores is attributed to changes over time.

It is clear from the above the data that students in the intervention got improved in the two out of three L2L competences and their self-perceived accomplishment of practicum after taking parting the intervention (i.e., attending the VR training and watching the P2P Youtube videos), and these positive changes can be maintained for some extent (3-4 months following the intervention). Therefore, hypothesis 1 of the study was partially supported.

Table 2. Descriptive statistics for repeated measure analysis of changes over time for the intervention group (N=107)

	Pretest (T1)		Posttest (T2)		Post-practicum test (T3)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Creativity	3.39	0.58	3.57	0.61	3.59	0.66
Professional identity	3.72	0.54	3.61	0.67	3.69	0.60
Teamwork	3.48	0.54	3.64	0.63	3.62	0.71
Intended learning outcomes	3.62	0.53	3.70	0.65	3.80	0.76

Between group difference

The changes of three L2L competence and the perceived academic outcome between two groups (intervention group, n=107 and comparison group, n=93) across two time points (T1 and T3) are shown (Table 3). *Chi-square test* and *T test* were conducted to confirm whether there was pre-intervention difference in terms of demographics (gender, age, mode of study and programme) and L2L scores. Data indicate none of the statistical test was significant at *p*≤.05. Thus, we can assume that these two groups were comparable, and they were similar in terms of background and L2L competences at the pre-intervention stage.

Statistical analysis with the general linear model indicates the between-group group difference in the changes of L2L competences and ILOs accomplishment over time is not significant while the effect size (partial η^2) is small. Therefore, hypotheses 2 and 3 of the study were not supported.

Table 3. Descriptive Statistics for the Difference Between the Intervention and Comparison Group (N=200)

	Intervention Group (N=107)				Comparison Group (N=93)			
	T1		T3		T1		T3	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Creativity	3.39	0.58	3.59	0.65	3.50	0.50	3.67	0.59
Professional identity	3.72	0.52	3.69	0.62	3.79	0.51	3.77	0.71
Teamwork	3.48	0.51	3.62	0.72	3.61	0.42	3.71	0.55
Intended learning outcomes	3.62	0.52	3.80	0.70	3.69	0.48	3.82	0.58

*The effect size (partial η^2) is small.

Conclusion and implications

This is an exploratory pedagogical attempt to utilize technology in actualizing the learn-to-learn principle in tertiary education in Hong Kong. Some insights for our education vision/innovation are generated below:

Involvement

A learner-centred approach: start where the learner is…

We believe the involvement of students in knowledge creation is crucial. In this project, social work and computer sciences students were involved in scriptwriting, casting in stories, video shooting, and online class dissemination. This arrangement helped incorporate learner (end-user) perspective and innovativeness in L2L education. For instance, ten teams of students delivered their online classes

on their chosen topics like stress management, time management, and the use of YouTube. The students regarded all these topics as important in the workplace.

Imagination

A taste of metaverse experience: Travelling to the future to acquire insights for solving the problem

In the project, students were encouraged to handle different career challenges in the year 2024 (future) in an immersive environment. For example, they visited a family living in a partitioned flat and offered crisis intervention to a secondary student who attempted suicide. Through this immersive exposure and the short discussion with the project staff, students could get insights to deal with the possible workplace challenges and enhance their professional identity and creativity in problem-solving.

Intertwining

Network building from school to work: Assisting students to team up across disciplines

Nurturing students' transversal and transferrable competencies are the foundation of tertiary education in the 21st century. If students are equipped with transversal competencies, they can easily fit in the inter-disciplinary collaboration that has been trending in the workplace. The social work and IT industries are no exceptions. In this project, social work students and computer sciences students could learn the perspective to each other—for example, how to incorporate humanity and technology into their future careers.

Interfacing

Knowledge building and transfer across disciplines, generations, and industries

This project interfaced with the knowledge and skills of multiple disciplines, from computer sciences to social work, across generations and parties (teachers, students, alumni, and industries). In particular, one graduate from our social work program in the 1980s helped connect us with some NGOs for video shooting venues and validating the VR story scripts. Another graduate from the computer science program in the 2020s assisted us with VR filming and cell-phone App design with his IT incubator firm. Our project demonstrates engagement with industries and alumni can facilitate our student learning.

In sum, learn-to-learn education which emphasizes students' autonomy, creativity, peer support and learning identity in the process of learning is believed to be essential in face of the coming of digital era and the disruption of classroom teaching by the infectious disease pandemic. It is evidence in this study that VR technology and online classes can facilitate student learn-to-learn competences to some extent. In spite of this contributions, technology is by no means a magic. For example, community visits, small group discussion among students, and video shooting together with students are all face-to-face activities which could not conducted online. While we are excited to witness the benefits bought by technology to University education, we need to remain alert to the problems like of "digital divide", "alienation between students and teachers", and "students with special learning needs". It calls for more vigorous research and resource input through cross-institutional collaboration, and our project team is happy to keep on taking a role in promoting L2L education in the future.

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REFERENCES

[1] Andersen, E. (2016 Mar). Managing yourself learning to learn. *Harvard Business Review*.

[2] Hoskins B, Fredriksson U. *Learning to Learn: What is it and Can it Be Measured*. EUR 23432 EN. Luxembourg (Luxembourg): OPOCE; 2008. JRC46532

[3] Education Council (2006) Recommendation of the European Parliament and the Council of 18 December 2006 on key competencies for lifelong learning. *Brussels: Official Journal of the European Union*, 30.12.2006.

[4] Deakin Crick, R.. (2014) Learning to learn. In R. Deakin Crick, C. Stringher & Ren K (eds.). *Learning to learn: international perspective from theory and practice* (pp. 66-86). London: Routledge.

[5] Baker, S. C., Wentz, R. K., & Woods, M. M. (2009). Using virtual worlds in education: Second Life® as an educational tool. *Teaching of Psychology*, *36*(1), 59-64.

[7] Pantelidis, V. S. (2010). Reasons to use virtual reality in education and training courses and a model to determine when to use virtual reality. *Themes in Science and Technology Education*, *2*(1-2), 59-70.

[8] Vernon, R., Lewis, L., & Lynch, D. (2009), Virtual worlds and social work education: potentials for "second life". *Advances in Social Work, 10*(2), 176-192.

[9] Anstadt, S., Bruster, B., Girmurugan, B. (2016). Using virtual world stimulators (second life) in social work course assignments. *International Journal of Learning Technology, 11*(1), 66-90.

[10] Harmin, M., & Toth, M. (2006). *Inspiring active learning: A complete handbook for today's teachers*. ASCD.

[11] Adams, K., Hean, S., Sturgis, P., & Macleod Clark, J.M. (2006). Investigating the factors influencing professional identity of first-year health and social care students. *Learning in Health and Social Care, 5*(2), 55-68. doi: 10.1111/j.1473-6861.2006.00119.x

[12] Yang, H-L., & Cheng, H-H. (2009). Creative self-efficacy and its factor: an empirical study of information system analysts and programmers. *Computers in Human Behaviour, 25*, 429-438.