Research and Practice in Technology Enhanced Learning
Vol. 8, No. 3 (2013) 347－362

THINKING FROM AN OPPOSING POSITION: A FRAMEWORK FOR A ROLE-REVERSAL PEDAGOGY USING TECHNOLOGY

BEN CHANG

Center for Teacher Education & Graduate Institute of Learning and Instruction, National Central University,
No. 300, Jhongda Road, Jhongli City, 32001, Taoyuan County, Taiwan, ROC.,
bchang.tw@gmail.com
http://web.cc.ncu.edu.tw/~ben/index.html

FU-YUN YU

Institute of Education, National Cheng Kung University,
No. 1. University Road, Tainan City 701, Taiwan (R.O.C.)
fuyun.ncku@gmail.com

YAN-YIN CHEN

E-Learning Design and Management, National Chiayi University,
85 Wenlong, Mingsuin, Chiayi Hsien, 62103, Taiwan (R.O.C.)
s0933484@mail.ncyu.edu.tw

HSIAO-TING HSIEH

Institute of Education, National Cheng Kung University,
No. 1. University Road, Tainan City 701, Taiwan (R.O.C.)
bigmother2046@yahoo.com.tw

The role-reversal learning approach is a powerful pedagogy that helps students develop higher-order thinking skills by gaining understanding of an opposing viewpoint. However, the use of this in the classroom has previously encountered several obstacles. New technologies provide innovative and situated learning methods that are able to overcome these obstacles. In this study, we developed a technology-enhanced role-reversal pedagogical framework, as well as three design principles and an activity flow. We established a Second Life simulation environment to support this framework, in which we conducted a virtual job interview activity. We then carried out two investigations from different perspectives to evaluate the technology-supported role-reversal activity. The results indicate that using a role-reversal job interview activity in an immersive environment helps students think both from the interviewer's and interviewee's viewpoints. Students also gain vital experience by participating in this activity, and improve the skills required to participate in interviews.

Keywords: Role reversal pedagogy; Second Life; immersive environment.

1. Introduction

Helping students develop thinking skills in situated environments is an important learning approach, and thinking from the perspectives of others and understanding their thoughts

are important learning skills. One goal of an academic education is to train students to solve problems in various domains. Role reversal, a common counseling skill, helps students experience different perspectives by playing an opposing role. This allows them to think from a different viewpoint, actively participate in activities, and develop more comprehensive ideas about specific subjects. An environment that allows for critical thinking from multiple perspectives thus provides valuable opportunities for students to improve their understanding of an issue. However, implementing role-reversal activities in a classroom environment requires a significant amount of additional work on behalf of the teacher, such as preparing teaching aids and designing more complex lesson plans, and this has limited the use of role-reversal approaches in such context.

Social interaction is a critical component of learning (Vygotsky, 1978). Learning, as it normally occurs, is a function of a specific activity in addition to the context and culture in which it occurs. However, this contrasts with most classroom-learning activities, which involve knowledge that is abstract and out of context (Lave, 1988). Although traditional role-reversal activities can provide a learning context for students, their use often raises many challenges, and thus they are not often applied in practice. Technology, particularly immersive technology, as an affordance (Gibson, 1977) can help help overcome these obstacles. For example, virtual-world simulations, such as Second Life, have many advantages, including the simulation of an expansive real-world environment, and the ability to carry out collaborative tasks and risk assessments (Foss, 2009). Second Life has already been used to enhance educational courses by enabling a wide range of interactions to occur among learners who are geographically distant, offering rich visualizations and contextualizations, exposing users to authentic content and culture, as well as allowing for individual and collective identity play, immersion, simulation, community presence, and content production (Warburton, 2009). Within Second Life the role-reversal approach can be used as an innovative learning experience that can both reduce the workload of teachers and encourage students to become more involved and immersed in certain activities, in ways that are not possible in traditional classrooms.

Despite the potential that immersive technologies, such as Second Life, have with regard to role-reversal activities, teachers still require a framework and guidelines if successful outcomes are to be achieved. This study thus provides a role-reversal learning framework with three design principles and an activity flow. The three design principles are situational authenticity and transformation, scaffolding, and role-playing and role-reversal. The role-reversal activity flow includes goal setting, role descriptions, environment establishment, background building, role-play/role-reversal activities, and reflection. To study student responses to this approach, a role-reversal job-seeking activity in the simulated environment established in Second Life was carried out, and the outcomes were evaluated.

2. Related Works

Role-playing and role-reversal activities are important counseling methods for students as by playing different roles they can think from different perspectives, and in recent years technology has been used to enhance the effects of such activities. In this section, we review several related works that examine the use of immersive technologies in learning activities, as well as the concept of role-reversal.

2.1. *Role-playing and role-reversal activities*

Role-playing is an effective method that is widely used in counseling, learning, training, and entertainment, and can be used in the classroom to increase interest in and comprehension of the subject being considered. A role-playing activity can teach students empathy and increase their understanding of different perspectives (Poorman, 2002), and this is especially true if a role-reversal strategy is used, which requires the participants to adopt an opposing view to that they normally hold. Empathy is defined as the ability to identify with the situation and perspective of another person, and thus, in the context of the current study, to think from the role of another (Feshbach, 1983). In addition to raising the ability to empathize, role-reversal also trains the ability to self-reflect. By interacting with others in this way, students can accumulate a broad range of thoughts and experiences. Role-reversal activities have been used in teacher-student pairs, parent-child pairs, employer-employee pairs, and so on. Although such activities have a number of benefits, they are not often used in the classroom because of the extra workload they create for teachers. However, new technologies can be applied to make the implementation of these activities easier, engaging both teachers and students in a computer-simulated environment.

2.2. *Technology for counseling*

Counseling services are increasingly applying technology to provide greater access and achieve better outcomes (Elleven & Allen, 2004; Lei, 1998), with common tools being telephones, email, online chat rooms, electronic bulletin boards, instant messaging services, and video conferencing (Wang, Lin, Liu, Yang, & Ling, 2008). While the advantages of technology-supported counseling include greater convenience, efficiency, and anonymity, key non-verbal messages and cues (e.g. body language and overall appearance) are often difficult or impossible to detect in such contexts. One way to overcome this problem, while still maintaining client anonymity, is the use of simulated, immersive environments, such as Second Life, and thus such technologies have been widely studied for their use in counseling, although more work is needed with regard to which approaches are most effective and accepted by participants in this context.

2.3. *Immersive technology*

Computer interfaces have undergone significant changes over the last two decades, with graphical, multi-media, and 3D systems now becoming more common. In such

environments people often use avatars to represent themselves, and these can be still images or fully animated 3D models, such as those seen in Second Life (Bell, 2009). In Second Life, users can socialize and interact using text and voice chats, as well as create objects and environments. Aside from its entertainment aspect, as a place to socialize and express creativity, it also has significant value with regard to educational applications (Andreas, Tsisatsos, Terzidou, & Pomportsis, 2010). In an academic context, a number of scholars have used Second Life as a tool for teaching and research (Warburton, 2009), and the 3D virtual environment that it provides can be used for teaching simulations and role-playing activities. Numerous educational applications have thus been carried out in Second Life (Beard, Wilson, Morra, & Keelan, 2009), such as art performance, lectures and other simulations.

3. Theoretical Considerations with regard to Technology-Enabled Role-Reversal Learning Activities

Empathy, situated learning, and role-playing are important elements that enable learners to develop new ideas, and role-reversal activities can be used to achieve this. Role-reversal is based on the notion that learners should attempt to think from an opposing position. Authentic role-reversal activities provide learners with the motivation to think broadly, adopting a fresh perspective in order to incorporate new knowledge into their existing mental frameworks, as well opportunities to apply this. The following subsections provide more details of the technology-supported role-reversal framework presented in this work.

3.1. *Benefits of a technology-supported role-reversal pedagogy approach*

Traditional role-playing or role-reversal is a student-centered activity, but one that is used less than it should be because it requires a considerable amount of time and space, as well as often specific stage props or sets in order to create an elaborate and authentic learning environment. However, such problems can be overcome with the aid of various computer and network technologies. Technology can be used to support the role-reversal pedagogy in the following ways:

(1) An immersive environment simulates a setting that is similar to a real-life one, and thus can be used by people who do not have easy access to a more authentic location.
(2) The cost of establishing a physical role-reversal environment is generally too high in practice, and constructing a virtual one is much cheaper.
(3) Physical environments are fixed, but virtual environment are dynamic and can be used to combine various media such as video, audio, pictures, and avatar gestures.
(4) 3D virtual reality technology can help users experience situations that lead to greater feelings of empathy and engagements.
(5) The ability to remain anonymous via the use of avatars can allow users to feel less anxiety in a virtual environment.

(6) The ability to play another role in a virtual world may result in less social pressure, and more opportunities to socialize with others.
(7) Second Life is user generated, in that users create their own objects, present themselves through avatars, and engage in various activities in their own spaces and those of others.
(8) Second Life is accessible online, and thus students can use it outside of the classroom. In addition, while a classroom occupies a limited space, the virtual world within Second Life is almost limitless.

3.2. *Technology-supported role-playing and role-reversal strategy design framework*

Role-reversal pedagogy is an important approach to help students learn to self-reflect, to adopt in an opposing viewpoint, and to organize their ideas by playing different roles. Figure 1 shows the three design principles proposed in this work for technology-supported role-reversal activities: (P1) situational authenticity and transformation, (P2) scaffolding, and (P3) role-playing and role-reversal activity. The following subsections explain the role-reversal activity flow used in this work, which is composed of goal setting, role descriptions, immersive environment establishment, background knowledge building, role-play and role-reversal activities, and reflection, discussion and debriefing.

3.3. *Situational authenticity and transformation design principle*

Thorndike and Woodworth (1901) suggested that transferring knowledge and abilities from one task to another only occurs when both tasks share identical elements. They also argued that a greater number of shared elements lead to a greater amount of transfer. Based on this idea, the main aim of a technology-supported role-reversal activity is to transfer the knowledge and skills gained in a pedagogical task into the real-word through the use of an immersive environment.

Figure 1. Technology-supported role-playing and role-reversal strategy framework.

Immersive technologies, such as Second Life, provide realistic environments within which various activities and scenarios can occur thus, enabling students to develop a rich contextual understanding of certain subjects (Broadribb & Carter, 2009). The situational authenticity and transformation design principle includes the three shared elements of learning subject, participants, and activity, which together can be used to provide learners with a rich and meaningful learning environment.

3.4. *Scaffolding design principle*

Scaffolding is a concept based on a theory proposed by Lev Vygotsky (1978), known as the Zone of Proximal Development (ZPD). In this view, scaffolds help students to build on prior knowledge and internalize new information, with the activities provided in scaffolding instruction being slightly beyond the level of what the learner can do alone, thus encouraging them to "stretch" and improve their abilities (Olson & Pratt, 2000). Role-reversal thinking is a high-level learning skill, for which learners must have some understanding of the various different backgrounds pertaining to the skills necessary to play a certain, and scaffolding can be used to achieve this (Elwell & Chang, 2010). Research has shown that scaffolding can also be provided when peers collaborate to help each other and share ideas (Stahi, Koschmann, & Suthers, 2006).

3.5. *Role-playing and the role-reversal design principle*

The design of the role-reversal activity is based on the following four major phases: the preparation phase, the original role activity phase, the role-reversal activity phase, and the reflection phase. These were used to develop the role-reversal activity flow used in this work, which follows the sequence of goal setting, role description, immersive environment establishment, background knowledge building, role-reversal activities, reflection, discussion, and debriefing, which are explained in more detail below.

(1) Goal setting: The first stage in designing a role-reversal activity is to set clear goals.
(2) Role description: After setting a goal, the next phase is to design a pair of roles that two learners can adopt.
(3) Environment establishment: Once the activity designer has set the goal and roles to be used in the role-reversal activity, the next phase is to design the environment within which these can be enacted. Several tools are available to achieve this, and this work uses Second Life, as it is user-friendly and especially well-suited to the aims of the current research.
(4) Background knowledge building: Learners will generally be unfamiliar with certain aspects of the role-reversal activity they need to take part in. While this means that they can learn new knowledge and skills, it also means that activity designers must provide certain background information so that they can achieve the stated goal and engage in more meaningful interactions.
(5) Role-playing and role-reversal activities: Once participants have the information needed to take part in the role-reversal activity, they are put in pairs and carry out the two phases of role-playing and role-reversal. In the former, the participants interact

with their partners to explore their assigned roles, and in the latter they exchange roles, thus adopting different perspectives and gaining new knowledge.

(6) Reflection, discussion, and debriefing: In the final stage, the activity leader and the participants discuss what they learned in the activity, and work to develop a set of conclusions.

4. An Example: Job-Seeking in Second Life

The role-reversal activity can be used with various different roles, such as parent-child, teacher-student, employer-employee, and seller-buyer activities. To illustrate the technology supported role-reversal framework developed in this work, we use the scenario of a job interview which takes place on an island in Second Life called Tweddle, in which the students took turns to act as both interviewers and interviewees. In the virtual interview environment, the students have an opportunity to practice responding to questions in a short period of time in an appropriate manner, and to formulate and ask interview questions from the employer's perspective, thus developing multiple ways of thinking.

4.1. *Second Life situational authenticity and transformation design*

Situational authenticity and transformation is the first design principle with regard to implementing the role-reversal learning activity. The setting for this activity is an island in Second Life, and specifically a three-floor building in this space (as shown in Figure 2), with a lobby as a waiting room on the first floor, a dressing room on the second floor, and the interview room on the third floor. If the participants have already installed the Second Life viewer on their computers, they can directly connect to this site using the following http://slurl.com/secondlife/Tweddle/31/152/82/?title=Ben%27s%20Lab%20Platform. They can also "teleport" to the site using its location code (28, 141, and 79).

The lobby is a check-in space reserved for social interaction among the participants (Figure 3). The questionnaire room, which hosts a set of vocational interest surveys and

Figure 2. Job interview venue.

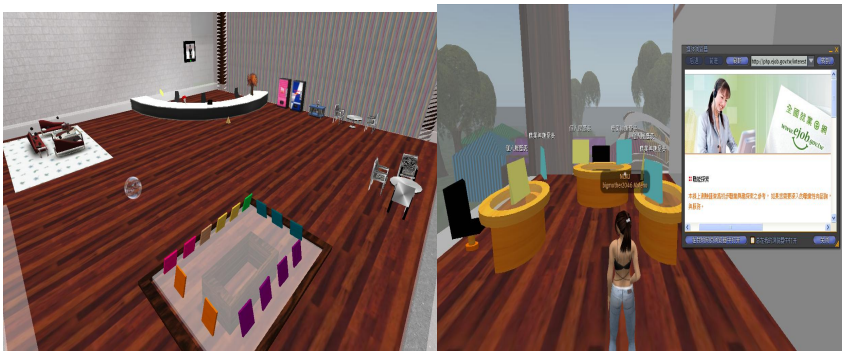

Figure 3. Job interview lobby.

example resumes, enables the students to learn more about their possible career interests, as well as how to present their personal data. The dressing room allows the participants to change their appearance (e.g. clothing, accessories, and hairstyle), which they do so by being transported to other spaces in Second Life. The resource room hosts a number of videos that show what different jobs usually do, so that they can learn more about the careers they are interested in.

First floor: Lobby

Figure 3 shows the lobby, which has areas in which the students can sit on a sofa and talk to each other, or practice moving around the Second Life virtual world by standing up, walking around, using a coffee machine, and so on. In the upper area of Figure 3 there is the front desk, and in the bottom area there is the journal area, which provides links to websites about looking for jobs using the SLOODLE technology (Kemp, Livingstone, & Bloomfield, 2009).

Second floor: Dressing room

On the second floor users can teleport to other sites in order to obtain clothing, accessories and hairstyles suitable for their job interview.

Third floor: Main interview scene

The third floor is the interview room, which contains tables and chairs, as well as a virtual whiteboard on which the interviewees can present their resumes and other data.

4.2. *Job-seeking scaffolding activity design*

Role-reversal activities require high-level thinking skills that pose considerable challenges to students. In order to provide the students with the background knowledge needed for the activity used in this work, we provided scaffolding based on general

Figure 4. SLOODLE learning environment.

background knowledge, as well as specific knowledge for the interviewer and interviewee.

General background knowledge

We used the SLOODLE system to develop the students' general background knowledge (Figure 4), linking Second Life and a learning management system. The SLOODLE system provides details of the general interview process, including interview guidelines and notes.

Interviewer background knowledge

To assist students who played the role of interviewers in preparing an interview plan, we used a career route map developed by the student department. The career route map acquaints students with their potential job offerings, the background knowledge of those offerings, and the background of their related companies. The career route map lays out a clearer career path for students who play the interviewer role; these students must study the career route map before the interview.

Interviewee background knowledge

An ePortfolio system was provided to the students before they played the role of an interviewee to help them prepare a resume. The resume content mainly includes self-introduction, educational background, work experience, career goals, autobiography, and school year report cards. Students completed a form to collect this information, and then used the resulting resume to apply for a job in Second Life.

4.3. *Role-playing and role-reversal activity design*

As stated in Section 3.5, the job interview role-reversal activity flow is as follows:

(1) Goal setting: The goal of this role-reversal activity is to give students an understanding of the job interview process, and to communicate the interviewer's intentions to the student.
(2) Role description: Those who play interviewers in this role-reversal activity must complete an interview plan, and the interviewees must complete their personal resumes.
(3) Environment establishment: As noted in Section 4.1, the role-reversal interview environment is set on an island within Second Life, inside a three-floor building. A lobby is on the first floor, a dressing room is on the second floor, and two meeting rooms are on the third floor.
(4) Background knowledge building: Three different kinds of scaffolding were designed to help guide the students; general background knowledge building using the SLOODLE system, interviewer background knowledge building using career route maps, and interviewee background knowledge building using the ePortfolio system.
(5) Role-reversal activities: Prior to the role-reversal activity, all the students were taught how to use Second Life. After becoming familiar with the system, three students playing the role-reversal activity were asked to work together to design their company logo, mission statement, job openings, required qualifications, and interview questions, based on the career route maps developed by their departments. Students playing the job-seekers needed to prepare their resumes and autobiographies responding to the job openings they were interested in, and then underwent a virtual interview. The students were able to change their appearance to best suit the role of interviewer or interviewee. After the interviews, the students then reversed roles. The role-playing and reversal-play activities require one hour to complete. Each group consisted of three students: two as interviewers, and one as interviewee.
(6) Reflection, discussion, and debriefing: In the final stage, the virtual job interview activity leader and the participants engaged in reflection, discussing the lessons they learned from the job interview activity, and then deriving some conclusions from this. All the participants were asked to produce self-reflection notes, which were saved in the SLOODLE system for further analysis.

5. Practice Effects Studies

To examine student responses when using technology in role-playing and role-reversal in an immersive environment, we conducted two studies covering a traditional and virtual interviewer counseling study, and a role-reversal job interview activity study.

5.1. *Traditional and virtual interviewer counseling study*

Forty-five university students majoring psychology were recruited for this study. A 10-minute slideshow showing the current practices of traditional face-to-face and Internet interview counseling was briefly reviewed before introducing the newly constructed counseling environment in Second Life. The students were asked to complete a questionnaire to collect on their preferences for and the perceived potential of three

Table 1. Preference and perceived potential of different counseling channels.

Preference	Traditional F2F	Internet counseling	Counseling in SL
Most preferred	42 (93.33%)	2 (4.44%)	1 (2.22%)
Second preferred	1 (2.22%)	25 (51.11%)	18 (40%)
Least preferred	1 (2.22%)	18 (40%)	23 (51.11%)
Averaged mean	2.93	1.63	1.48
Perceived potential	**Traditional F2F**	**Internet counseling**	**Counseling in SL**
Most preferred	17 (37.78%)	11 (24.45%)	17 (37.78%)
Second preferred	10 (22.22%)	22 (48.89%)	13 (28.89%)
Least preferred	18 (40%)	12 (26.67%)	15 (33.33%)
Averaged mean	1.98	1.98	2.04

different interview counseling channels–face-to-face, online, and Second Life–and the factors influencing their choice of channel when seeking counseling.

The results show that most students (93.33%, see Table 1) preferred traditional face-to-face counseling over the other two channels for their counseling needs. In addition, with regard to the perceived potential of these channels, an equal amount of respondents (37.78%) chose traditional face-to-face and Second Life. After converting participant scores (most preferred and highest potential as 3, second preferred and medium potential as 2, and least preferred and lowest potential as 1), Second Life had the highest average score on the potential index (2.04) and the lowest on the preference index.

More than half the students also indicated that the anonymity, convenience, privacy, and interactivity available at a counseling site were important factors when choosing a counseling channel (Table 2).

Several important results were obtained. First, although Second Life was least preferred by the respondents, they felt that it had good potential. Second, although relatively few respondents stated that variety and freedom of choice regarding counselors and counseling sites were important factors, as compared to anonymity, convenience, privacy, and interactivity, nearly one-fourth (24.44%) and more than 40% (44.44%) of respondents viewed them as significant.

The Technology Acceptance Model (TAM), originally proposed by Davis (1989), has

Table 2. Factors influencing the students' choice of counseling site.

	N	%	Rank
Anonymity	31	68.89	3
Convenience	31	68.89	3
Privacy of counseling site	38	84.44	2
Diversity of counseling sites	11	24.44	6
Interactivity	39	86.67	1
Freedom to choose the counselor	20	44.44	5
Appearance personalization	3	6.67	7

been extensively studied and validated in information technology industrial and business domains to explain user adoption of innovative technologies. As suggested by TAM, the behavioral intention to use a new technology is the dominant factor influencing their later actual behavior (Davis, 1989), and this intention is influenced by the perceived usefulness and perceived ease of use of the technology (Davis, Bagozzi, & Warshaw, 1989; King & He, 2006; Legris, Ingham, & Collerette, 2003).

As such, while the participants in our study could see the potential of using Second Life in counseling (i.e. it had high perceived usefulness), their lack of experience in using the system, especially for counseling, reduced its perceived ease of use. Still given the results of the present study and the positive affordances of Second Life, its potential for use in university counseling should be further explored.

5.2. *Role-reversal job interview activity study*

Twenty-eight junior and senior undergraduate students, 12 men and 16 women, were involved in this study. Among them, eight students were from the Chinese Department (CD), 12 were from the E-Learning Design and Management Department (ED), and eight were from the Art Department (AD). Before the formal experiment, the students took part in a warm-up exercise to familiarize themselves with the Second Life interface. Before the activities, all the students were asked to complete a company survey based on the related career route map, and to enter their personal resumes and autobiographies into the ePortfolio system. Three students functioned as a group: two interviewers, and one interviewee. The role-playing and role-reversal activities took a total of one hour to conduct per group.

Data were obtained from the questionnaires and self-reflection notes. Table 3 lists the statistics for the self-reflection notes from 27 participants (one student refused to write this text). The total number of words in the self-reflection notes was 7,941, and the average per student was 294.1 words.

The coding schema shown in Table 4 was applied to analyze the self-reflection notes, in order to explore the intentions that they revealed. More specifically, the notes were cataloged into 17 sub-catalogs covering the interviewer perspective, interviewee perspective, interaction, peer performance, role-reversal benefits, emotional responses, avatar design, and suggestions for improvement.

All the notes were read sentence by sentence by two raters to carry out coding based on the schema in Table 4. If the raters both agreed that a sentence belonged to a particular schema, then that schema received one point. The sum of the points for each schema may be greater than the number of the participants, because one participant's notes might have more than one sentence for each schema item.

Based on the analysis of the self-reflection notes, the students stated that they needed to be careful with regard to how they asked questions from the interviewer's perspective (A-3). The students were aware that preparing for the interview was crucial (B-1), and how to respond to the interviewer (C-1) and interviewee (C-2) was also important. Certain students were aware more of their partners' performance, and discussed it in their

Table 3. Self-reflection note statistics.

ID	Department	Sex	Number of words in self-reflection notes
S01	ED (senior)	F	559
S02	ED (senior)	F	134
S03	ED (senior)	F	475
S04	ED (senior)	F	332
S05	ED (junior)	F	805
S06	ED (junior)	F	548
S07	ED (junior)	M	86
S08	ED (junior)	M	142
S09	ED (junior)	F	184
S10	ED (junior)	F	509
S11	ED (junior)	M	200
S12	ED (junior)	M	153
S13	AD (junior)	F	366
S14	AD (junior)	F	403
S15	AD (junior)	M	291
S16	AD (junior)	M	297
S17	AD (junior)	F	219
S18	AD (junior)	F	93
S19	AD (junior)	M	420
S20	AD (junior)	M	228
S21	CD (junior)	F	136
S22	CD (junior)	F	201
S23	CD (junior)	M	526
S24	CD (junior)	M	265
S25	CD (junior)	F	83
S26	CD (junior)	F	183
S27	CD (junior)	M	103
S28	CD (junior)	M	-

notes (D-1 and D-2). Other students stated that being the interviewer or interviewee made them feel nervous, but nearly the same number of students stated that they felt relaxed carrying out the role-reversal activities in the simulated environment.

The participants also mentioned that they felt that using a role-reversal interview activity in a simulated environment enabled them to gain more effective job interview experience, by acting as both the interviewer and interviewee. As Table 4 shows, most of the participants stated that they made efforts to ask appropriate questions, and respond well from the interviewer and interviewee perspectives. The participants also showed high interest in Second Life and the interview activities carried out there.

Other results from the five-point Likert item questionnaire are as follows:

- I enjoy Second Life as an immersive environment (*M = 3.54*).
- I am willing to use Second Life (*M = 2.94*).
- I am willing to spend time using Second Life (*M = 3.46*).

Table 4. Coding results statistics.

Catalog	Coding schema	Coding numbers n (%)
Interviewer perspective	A-1: Interview questions sequence	2 (1%)
	A-2: Clarification of the interview questions	7 (5%)
	A-3: Proposing appropriate questions	15 (11%)
	A-4: Self-reflection	6 (4%)
Interviewee perspective	B-1: Preparing for the interview	10 (7%)
Interaction	C-1: Responses from the interviewer's perspective	13 (9%)
	C-2: Responses from the interviewee's perspective	33 (24%)
Peer performance	D-1: Evaluation from the interviewer's perspective	7 (5%)
	D-2: Evaluation from the interviewee's perspective	2 (1%)
Role reversal's benefits	E-1: Role reversal's benefits when playing interviewer	3 (2%)
	E-2: Role reversal's benefits when playing interviewee	2 (1%)
Emotional response	F-1: Playing an interviewer makes me feel nervous	4 (3%)
	F-2: Playing an interviewer is relaxing	4 (3%)
	F-3: Playing an interviewee makes me feel nervous	9 (7%)
	F-4: Playing an interviewee is relaxing	9 (7%)
Avatar design	G-1: Avatar outline	4 (3%)
Suggestion	H-1: Comments	7 (5%)

- I think this activity enhances my ability to think about and plan my future career (*M = 3.58*).
- I think it is helpful for students to engage in such a role-reversal activity (*M = 3.96*).

Among the participants, 37.5% preferred being interviewers, and 12.5% preferred being interviewees, while half of the participants enjoyed playing both roles equally. They stated that the activity taught them about the importance of preparing for an interview, and in what areas they need to improve. As mentioned above, due to the participants' lack of experience in Second Life and the steep learning curve involved, it is understandable that while most recognized the potential that this system has with regard to role-reversal job interviews (as seen in their willingness to spend time using Second Life and their feeling that it enhanced their student abilities to think about and plan their future careers), they also expressed hesitation with regard to being willing to keep using Second Life without any further training. The results thus show that Second Life immersive environment can be used to facilitate role-reversal interview activities to help undergraduates to prepare for job interviews, despite their unfamiliarity with using this system.

6. Conclusions

Thinking from a different perspective is an important skill that is helpful for students. Role-playing and role-reversal activities are general pedagogies that are commonly used in counseling to help students develop a broader range of thinking skills and gain a more

comprehensive understanding of an issue. While this approach could thus be applied in the classroom as a student-centered and engaging learning activity, it is often not used due to the considerable logistic support that it requires. However, technology can be used to overcome such problems, by providing a simulated, situated learning environment, which enables students to have greater empathy by adopting different roles in a scenario.

In this work we developed a technology-supported role-reversal pedagogical framework that includes the concepts of situational authenticity, transformation, scaffolding, role-playing, and role-reversal, as well as a related activity flow. Based on this role-reversal pedagogical framework and activity flow, we designed and implemented an immersive environment-supported job-seeking activity, in which students took turns to be both interviewer and interviewee, in order to better understand the expectations and experiences of both sides.

The role-reversal activity based on job interviews in the Second Life environment that was carried out as part of this study provided the students with enjoyable experiences. The participants showed high interest in both Second Life and the activities, and also learned the importance of preparing for an interview and how they needed to prepare their interview.

Acknowledgments

This project was supported in part by the National Science Council of Taiwan, Republic of China under grant NSC 99-2511-S-415-006-MY2. We are also grateful to the undergraduate students who participated in this study.

References

Andreas, K., Tsisatsos, T., Terzidou, T., & Pomportsis, A. (2010). Fostering collaborative learning in Second Life: Metaphors and affordances. *Computers & Education*, *55*, 603–615.

Beard, L., Wilson, K., Morra, D., & Keelan, J. (2009). A survey of health-related activities on Second Life. *Journal of Medical Internet Research*, *11*(2), e17. doi:10.2196/jmir.1192

Bell, D. (2009). Learning from Second Life. *British Journal of Educational Technology*, *40*(3), 515–525.

Broadribb, S., & Carter, C. (2009). Using Second Life in human resource development. *British Journal of Educational Technology*, *40*(3), 547–550.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*, 319–339.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*, 982–1003.

Elleven, R. K., & Allen, J. (2004). Applying technology to online counseling: Suggestions for the beginning e-therapist. *Journal of Instructional Psychology*, *31*(3), 223–226.

Elwell, M., & Chang, B. (2010). Mission-oriented situated second language learning in Second Life. *IEEE Learning Technology Newsletter*, *12*(1), 62–65.

Feshbach, N. (1983). *Learning to care: Classroom activities for social and affective development*. San Francisco: Goodyear Pub Co.

Foss, J. (2009). Lessons from learning in virtual environments. *British Journal of Educational Technology*, *40*(3), 556–560.

Gibson, J. (1977). The theory of affordances. In R. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: Toward an ecological psychology* (pp. 67–82). NJ: Lawrence Erlbaum Associates.

Kemp, J., Livingstone, D., & Bloomfield P. (2009). SLOODLE: Connecting VLE tools with emergent teaching practice in Second Life. *British Journal of Educational Technology*, *40*(3), 551–555.

King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management*, *43*(6),740–755.

Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. Cambridge, UK: Cambridge University Press.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management, 40*, 191–204.

Lei, Y. M. (1998). Issues on real-time individual counseling in cyberspace. *Student Guidance*, *56*, 100–109.

Olson, J., & Platt, J. (2000). *The instructional cycle: Teaching children and adolescents with special needs*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Poorman, P. B. (2002). Biography and role-playing: Fostering empathy in abnormal psychology. *Teaching of Psychology*, *29*(1), 32–36.

Stahi, G., Koschmann, T., & Suthers, D. D. (2006). Computer-supported collaborative learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning science* (pp. 409–425). New York: Cambridge.

Thorndike, E. L., & Woodworth, R. S. (1901). The influence of improvement in one mental function upon the efficiency of other functions. *Psychological Review*, *8*, 247–261.

Vygotsky, L. (1978). *Mind in society*. Cambridge: Cambridge University Press.

Wang, C. H., Lin, C. W., Liu, S. H., Yang, C. F., & Ling, X. Y. (2008). A survey research study on the development of cyber counseling services in Taiwan. *Bulletin of Educational Psychology*, *39*(3), 395–412.

Warburton, S. (2009). Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology*, *40*(3), 414–426.