Interaction of Communication Formats and Personality in Teaching Problem Solving in Virtual Reality Flipped Classroom upon Abilities in Problem Solving of Undergraduate Students

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Abstract

This research aimed to study about interaction of communication formats and personality in teaching problem solving in virtual reality flipped classroom upon abilities in problem solving of undergraduate students. This study used an experiment research design and a factorial design 2X2. Two independent variables were: 1) two types of communication formats: Text-Based; Voice-Based and 2) two types learner personality: Introvert personality; extrovert personality. The samples were 100 undergraduate students enrolled in innovation and education information technology at second semester, academic year 2016. They were divided into four groups, each group had 25 students. The research instruments were: 1) flipped classroom lesson plans 2) virtual reality flipped classroom 3) The Maudsley Personality Inventory (MPI) 4) abilities in problem solving test. Data were analyzed using two-way ANOVA.

The findings were as follows:

1. The students studied with Voice-Based in flipped classroom with virtual reality had higher abilities in problem solving score than Text-Based at the .05 level of significance.

2. The extrovert personality students studied in flipped classroom with virtual reality had higher abilities in problem solving score than introvert personality students at the .05 level of significance.

3. The was no interaction between communication formats and learner personality regarding the development of abilities in problem solving at the .05 level of significance

Keywords: Communication formats, Flipped classroom, Virtual reality, Abilities problem solving, Learner personality

Introduction

Virtual learning environments (VLEs) provide authentic context in which students create and share virtual assets and develop their scope of learning (Lin and Kuo 2005) and
are perceived as more meaningful for contemporary net generation students (Sandars and Morrison 2007). Virtual worlds have great educational advantages and potential impact on language learning (Peterson 2006) and Falloon (2010) explored the potential of virtual environments to act as powerful communication mediums for students to engage in the development of higher order thinking skills. Results showed that students demonstrated the full range of thinking skills of Bloom's Taxonomy, from lower recall to higher order evaluation, knowledge construction, and communication. Antonacci and Modaress (2005) studied on the educational possibilities of

massively multiplayer virtual worlds in SL indicated that student engagement in virtual environments can assist the development of higher order thinking skills such as interpretation, analysis, evaluation and problem-solving.

The use of flipped classroom approach has been extensively studied, especially in the contexts of higher education. Flipped classroom approach has become a popular pedagogy in many education institutes around the world. The basic notion of flipped classroom approach is to deliver the teacher's lectures before class through online videos in order to free-up the in-class time for active learning and problem solving activities. Chung Kwan Lo and Khe Foon Hew (2017).

Personality can be classified distinctively on the basis of different and/or singular parameters like traits, physical structure, temperament and nature.

Introvert Personality: Individuals who prefer to remain isolated or in the company of very few people, can be categorized as ones who have an introverted personality. Introvert people are more prone to thinking, and are thus involved in creating novel entities. They have keen interest in their own psyche. They are formal, idealistic, less social, talk less and brood about the future. They involve themselves minimally in social activities or in those activities which demand their active and direct interaction with many people. They remain passive and avoid being in the centre stage, or recognition of any kinds. They are shy and inscrutable. They may appear to be dull and devoid of enthusiasm to others. They prefer indoor activities, to outdoor ones.

Extrovert Personality: Individuals possessing this personality type are social, practical, appeared affectionate, informal, good conversationalists, active and lively. They are habitually outgoing, venturing forth with confidence into the unknown. They prefer outdoor activities; tend to be essentially social-participating in various social and personal activities. They appear full of energy and tend to involve themselves in a variety of pursuits. They are generally good leaders of big and small groups; they apparently live in the present, concentrating on current activity. These individuals adapt easily to a given situation and are particularly influenced by objects and events in the external world. Deepti bhandari (2011).

Communication Formats: The communication method between the learner and the learner for online learning activities in virtual reality that the learners can interact.

Communication format: Voice-Based. The learners online learning activities in virtual reality flipped classroom use headphone and webcam for voice.

Communication format: Text-Based. The learners online learning activities in virtual reality flipped classroom use text in chat group based on the given topic.

This research was to study about Interaction of Communication Formats and Personality in Teaching Problem Solving in Virtual Reality Flipped Classroom upon Abilities in Problem Solving of undergraduate students.

Research Objective

1. The comparison of communication formats in teaching problem solving in virtual reality flipped classroom upon Abilities in Problem Solving of undergraduate students.

2. The comparison of different learner personality in teaching problem solving in virtual reality flipped classroom upon abilities in problem solving of undergraduate students.

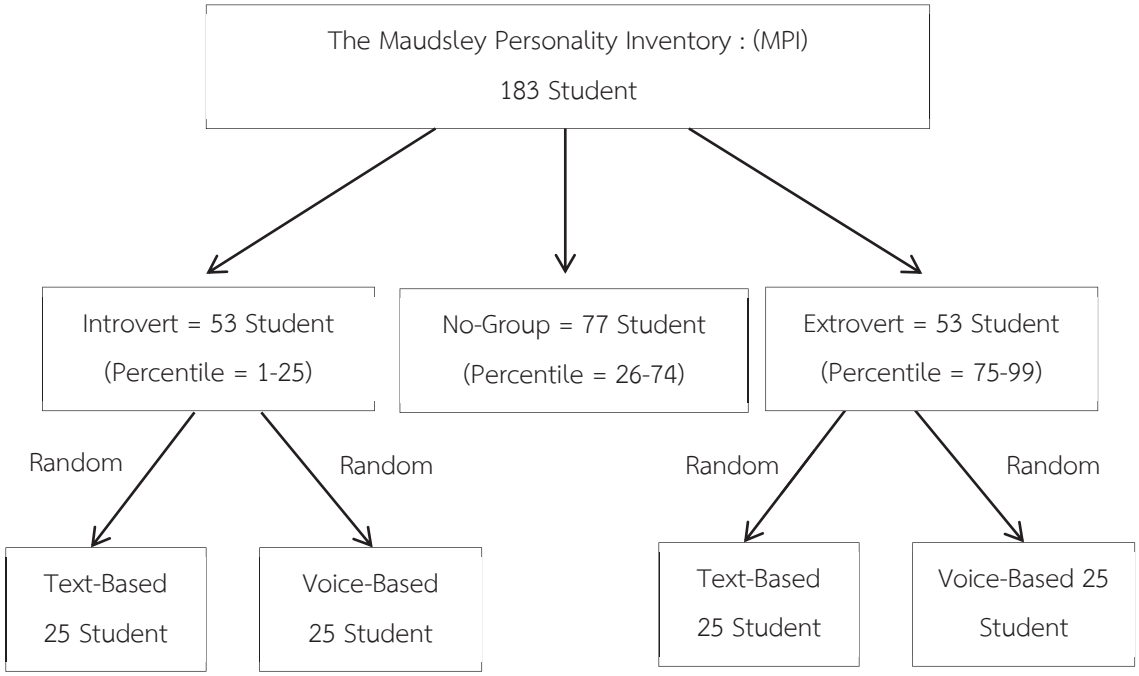
3. Interaction between communication formats and different learner personality in teaching problem solving in virtual reality flipped classroom upon Abilities in Problem Solving of undergraduate students.

Research Method

Population and Samples.

The research population was undergraduate students in Surindra Rajabhat University.

The samples were 100 Thai undergraduate students at Surindra Rajabhat University, enrolled in innovation and education information technology at second semester, academic year 2016. They were divided into four groups, each group had 25 students.



Picture1 Random sampling of The Maudsley Personality Inventory : (MPI)

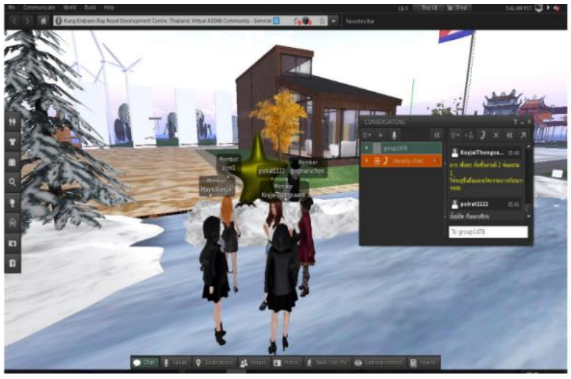
Experiment Research Design

This study used an experiment research design and a factorial design 2X2. Two independent variables were: 1) two types of communication formats: Text-Based and Voice-Based and 2) two types of personality: introvert and extrovert

Text-Based was real-time communication. Student can make a discussion by sending message in groups in virtual reality flipped classroom.

Voice-Based was realtime communication. Student can used Voice Chat, headphone, webcam microphone and discussion using tolls called “Speak” in Second Life

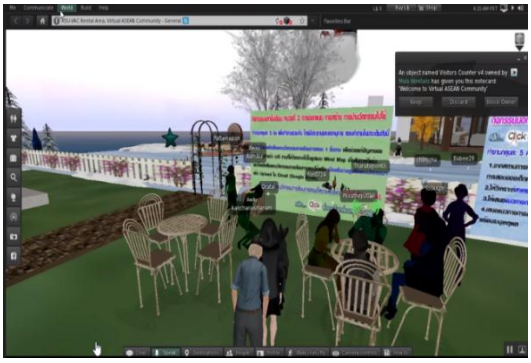
Experimental Activities



Picture2 Communication formats **: Text-Based**

Picture3 Communication formats **: Voice-Based**

Picture4 Classroom activities



Picture5 Out-of-class activities

Table 1 Experimental design and sample size

Personality	communication formats		Total
	Text-Based	Voice-Based	
Introvert- personality	25	25	50
Extrovert- personality	25	25	50
Total	50	50	100

Research Variables

1. Independent Variables were
   1.1 communication formats
      - Text-Based
      - Voice-Based
   1.2 Personality
      - Introvert-personality
      - Extrovert-personality
2. Dependent variable was Abilities in Problem Solving

Research Tools

The tools used in the experiment included:

1. Flipped classroom lesson plans
2. Virtual reality flipped classroom (Second Life)
3. The Maudsley Personality Inventory (MPI)
4. Abilities in Problem Solving test.

Data Collection

The researcher had conducted the experimentation with the designed types to the 4 sample groups for 7 weeks in the second semester of the academic year 2016.

Experimental Method

1. Pre-experiment

1) The Maudsley Personality Inventory (MPI) Test form was administered to the samples.

2) Steps involved in the learning plans were explained to the samples.

3) All the samples were asked to try to register into virtual reality (Second Life) by creating avatar.

2. Experiment steps

1) An orientation was given to each group in regular classes about learning activities, assessment systems, learners' roles and instructor's roles in the virtual reality (Second Life)

- All the learners were asked to enroll in virtual reality (Second Life) ,

2) The online instruction was conducted according to the designed online sharing learning management for each experimental group. Each group would participate in learning for seven weeks during the second semester of the academic year 2016.

3. Post- experiment

After the 4 experimental groups learnt the online lessons according to the plans, they were administered with problem solving abilities.

Problem Solving Abilities is an essential skill for workplace and personal situation learning how to solve problems more effectively with step by step. Weir (1974)

The activities in the program provided students a change to:

1. Identify the problem
2. Identify and analyze the cause of the problem
3. Propose a problem solving
4. Result evaluation

Data Analysis

The statistics used in the data analysis were the descriptive statistics including average means, standard deviation, and inferential statistics including finding interaction between Communication Formats and Personality in Teaching Problem Solving in Virtual Reality Flipped Classroom upon Abilities in Problem Solving of undergraduate students by using 2-way ANOVA.

Research Findings

The findings were as following.

Table 2 average means and standard deviation of learning achievement scores classified by lesson content presentation and feedback types.

Personality	communication formats				Total	
	Text-Based		Voice-Based			
	$\bar{x}$	S.D	$\bar{x}$	S.D	$\bar{x}$	S.D
Introvert- personality	65.57	6.99	69.55	5.08	67.56	6.37
Extrovert- personality	67.85	4.96	71.66	4.43	69.75	5.03
Total	66.71	6.11	70.60	4.83	68.65	5.82

Table 2 showed means and standard deviation of problem solving abilities scores classified by communication formats and learner personality with the following details.

1. The average means of the problem solving abilities from different types of lesson communication formats and learner personality showed the group who learnt with voice-based and extrovert had the highest average means ($\bar{X}$ =71.66), the second was the group learnt with voice-based and extrovert ($\bar{X}$ =69.55), and the group learnt with text-based and extrovert had the lowest average means (=67.85)

2. The average means of the scores from the solving abilities from the difference of the sample groups when learnt from online lessons with different communication formats showed the group learnt from voice-based had higher means of solving abilities from different scores ($\bar{X}$ =70.60) than the sample group who text-based score ($\bar{X}$ =66.71).

The analyses could not show the statistic differences, thus the data were analyzed by 2-way ANOVA. Details were showed in Table 2.

Table 3 results of the 2-way ANOVA analysis of Abilities in Problem Solving score.

Variance Source	SS	df	MS	F	Sig
communication formats	379.276	1	379.276	12.746*	.001
Personality	120.451	1	120.451	4.048*	.047
Communication formats & personality	.181	1	.181	.006	.938
Error	2856.550	96	29.756		
Total	474741.688	100			

* Sig. <.05

Table 3 results of the 2-way ANOVA analyses could be concluded as follows.

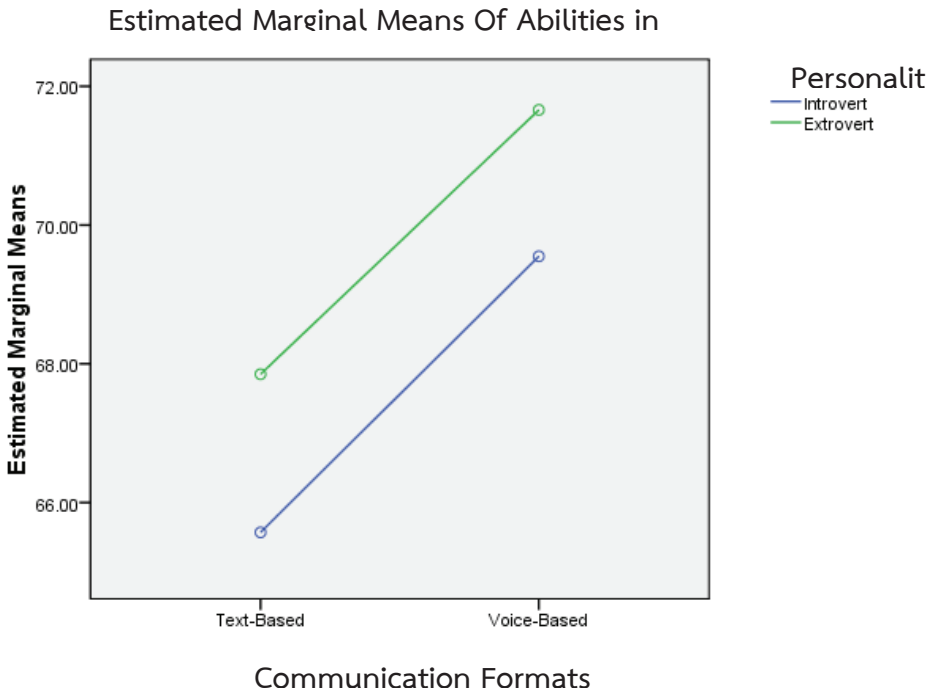
1) The students studied with different communication formats in flipped classroom with virtual reality had difference on problem solving abilities at the .05 level of significance.(F = 12.746, Sig = .001)

2) The students studied with different learner personalities in flipped classroom with virtual reality had no difference on problem solving abilities at the .05 level of significance. (F = 4.048, Sig =.047)

3) There was no interaction between communication formats and learner personality regarding the development of problem solving abilities score at the .05 level of significance. (F =.006, Sig=.938)

The results could be drawn as in Picture 6.

Estimated Marginal Means Of Abilities in Problem



Picture 6 The graph of the No-interaction between Communication Formats And Personality

in Teaching Problem Solving in Virtual Reality Flipped Classroom upon Abilities in Problem Solving of undergraduate students

Discussion

1. The students studied with Voice-Based in flipped classroom with virtual reality had higher abilities in problem solving score than Text-Based. had difference on problem solving abilities at the .05 level of significance. (F=12.746, Sig=.001). the results agreed with LaPointe (2004). Referred to synchronous audio communication, their proposed model of instruction was based on the specific benefits of using voice to teach English as a second language in Taiwan. The authors reviewed the literature related to the use of audio in online environments and reported evidence that indicated relationships among participants developed more rapidly when voice capability was present. In addition, the result of the exchange of personal information promoted a higher level of familiarity, which led to a greater degree of social presence. Students integrated verbal and visual representations better when they were received simultaneously than when they received materials and exchanges of text only. The audio technology also enabled participants to bridge cultural differences and established communities more rapidly than other methods. The findings also agreed with Marriott and Hiscock (2002) explored the use of voice-based asynchronous computer conferences in an undergraduate communications course using Horizon Wimba voice board software to facilitate the process. The findings also agreed with Biao Bin Pang and Khe Foon Hew (2014). In this study, we examined the use of Wimba Voice Board and a text-based online discussion in supporting students' critical thinking. Specifically, we addressed the following question, ''Is there any significant difference in the level of students' critical thinking in asynchronous audio compared to text discussions?'' Two undergraduate classes participated in the study. Students produced more

than expected higher critical thinking levels during asynchronous audio discussion. On the other hand, students exhibited more than expected lower critical thinking in asynchronous text discussion. The findings also agreed with Kwak, H. (2001). Some differences between text-based chatting and voice-based chatting are found. For instance, the results suggested that voice chatting was appropriate for an equivocal task since it provided some benefits of a "rich" medium (i.e., immediacy of feedback, personalization, multiple cues).

2. The students studied with Extrovert-personality in flipped classroom with virtual reality had higher abilities in problem solving score than Introvert-Personality had difference on problem solving abilities at the .05 level of significance (F=4.048, Sig=.047). The results agreed with Opt and Loffredo (2000) showed that participants who preferred introversion or sensing reported significantly higher levels of communication apprehension in general and across the group, dyadic, meeting, and public contexts than did participants who preferred extraversion or intuition. In addition, participants who preferred feeling reported higher levels of communication anxiety in the public context than those who preferred thinking.

3. When the sample group was no interaction between communication formats and learner personality regarding the development of problem solving abilities score at the .05 level of significance (F = 0.006, Sig=.938). The results agreed with the learners have a personality: Extrovert; Introvert. It used the form of communication with text or using the form of voice communication. There was no difference in the ability to solve problems. This may be because in the virtual classroom (Second Life), the learner used his or her own avatar (Avatar) instead of himself. The findings also agreed Starr Roxanne (1997). Teaching using Virtual Classroom, most students rated higher in the following areas, such as interesting content, encouraged participation in more study, good contact with teachers and easiness in learning. The findings also agreed Siraporn Siriphanlop and Choonhapong Thaiupathump (2016). Our suggestions are 1) students should be encouraged to use Second Life for self-learning, which will give students more occasions to practice English. A strategy to get students to practice English in Second Life as an extra- curriculum activity will be proposed; and 2) more hands-on training should be provided to the students upon request.

Suggestions

From the experiment, the researcher had suggestions for the application of the research results as well as suggestions for further research, as follows.

1. Teacher should choose voice-based for communication in teaching and learning with virtual reality flipped classroom upon abilities in problem solving of undergraduate student.

2. In teaching and learning with virtual reality flipped classroom upon abilities in problem solving of undergraduate student suitable for the extrovert personality students.

3. Communication format: Voice-Based. The instructor should advise the student to understand the sound settings of the microphone, sound through the notebook and sound is not clear.

4. Communication format: Text-Based. The instructor should advise the student to create a Chat Group because of the situation.

5. Virtual Reality design should include Augmented reality (AR) for creative thinking

6. Virtual Reality design should include creative designs for classrooms to look as different classroom

7. Discipline in character control (Avatar) provides the appropriate behavior as real life skills.

8. Should study on characteristics of student or learning style.

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