Virtual Learning for Human Respiratory System Via Non-Immersive VR (V-HURESYS): An Evaluation

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Introduction

- Why?
  - Students commonly fail in science subject due to a lack of proper teaching methods as well as the insufficiency of necessary teaching aids (A.R.B.Olayinka, 2016)
  - Students usually find it hard to understand because of the complicated concept, a biological process that cannot witness with the eyes, abstract concepts as well as terminologies (A. Crimer, 2012).
  - Students thought that memorizing is the only way in learning biology subjects in schools (A. Crimer,2012).

Introduction

To study something new in order to enhance one's knowledge, Student must possess the necessary information on the subject.

To be able to learn effectively, student must assess a new advancement of knowkedge such as science subject.

Student must have the ability to differentiate between the knowledge that has already discovered and new areas that should explore to become effective leaners.

Student who can ultimately oversee their knowledge would be able to focus on their energy and time to learn the areas of knowledge.

INTRODUCTION

Method of teaching and materials are essential aspect required to convey the knowledge.

Both are fundamental in promoting teacher's competency and upgrade student's knowledge and apabilities.

Virtual Reality (VR) is one of the instructional aid used in effective teaching and learning.

VR technique is a type of computer-generated simulations in 3D environment.

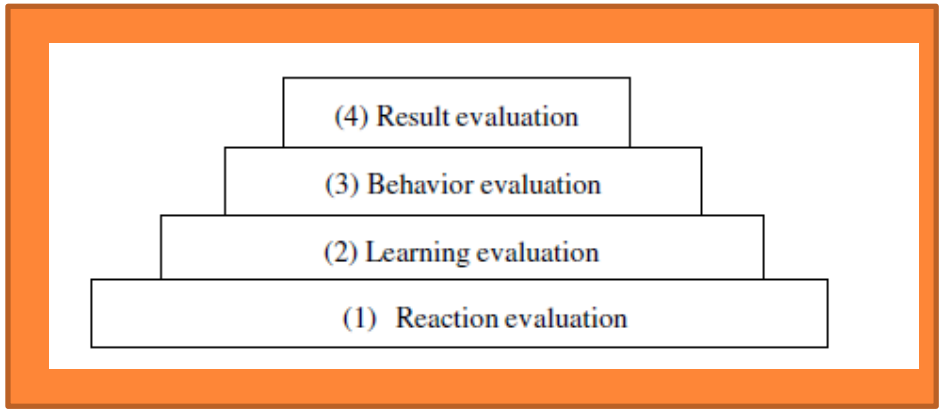
VR reflected in the improvements in prescribed structures of knowledge

Exercise on visualization helped to conceptualize, initiate and evaluate the understanding of students' performance.

Hence, the objectives of this study is to evaluate the effectiveness of application in learning the Human Respiratory System through VR application.

RESEARCH BACKGROUND

Kirkpatrick's Model



- Is used to evaluated a training's effectiveness (M. Paul, C.Whitsed, A. Girardi, 2016)
- Fields of training adapted Kirkpatric's model by utilizing four levels of evaluation :
  - Comprises outcome
  - performance
  - knowledge
  - motivation
- All correlated to
  - reaction
  - learning
  - behavior
  - result

- it uses the iterative approach

RESEARCH BACKGROUND

Kirkpatrick's Model

Example adaptation:

- technical communication services and product such as assessment of learning in higher education

- Use questionnaires as pre-quiz and post-quiz to evaluate trainess' learning effectiveness and analyze using descriptive statistics.

Methodology

Participants

- Form 3 students in secondary school who take science subjects.
- 35 students.
- Occurred at Sek Men Pak Badol, Kota Bharu, Kelantan.
- Investigate the usage of non-immersive virtual reality for students to learn Human Respiratory System.
- Three types of questionnaires.

Methodology

Instrument

Pre-test (before used the application) and Post-test (after used the application)

To test if respondents understand the V-HURESYS application (This not being discussed in this paper)

Effectiveness -Kirkpatrick model

To test the effectiveness of the V-HURESYS application

Information aimed: achievement, understanding, interest, effectiveness, how students perceive

METHODOLOGY

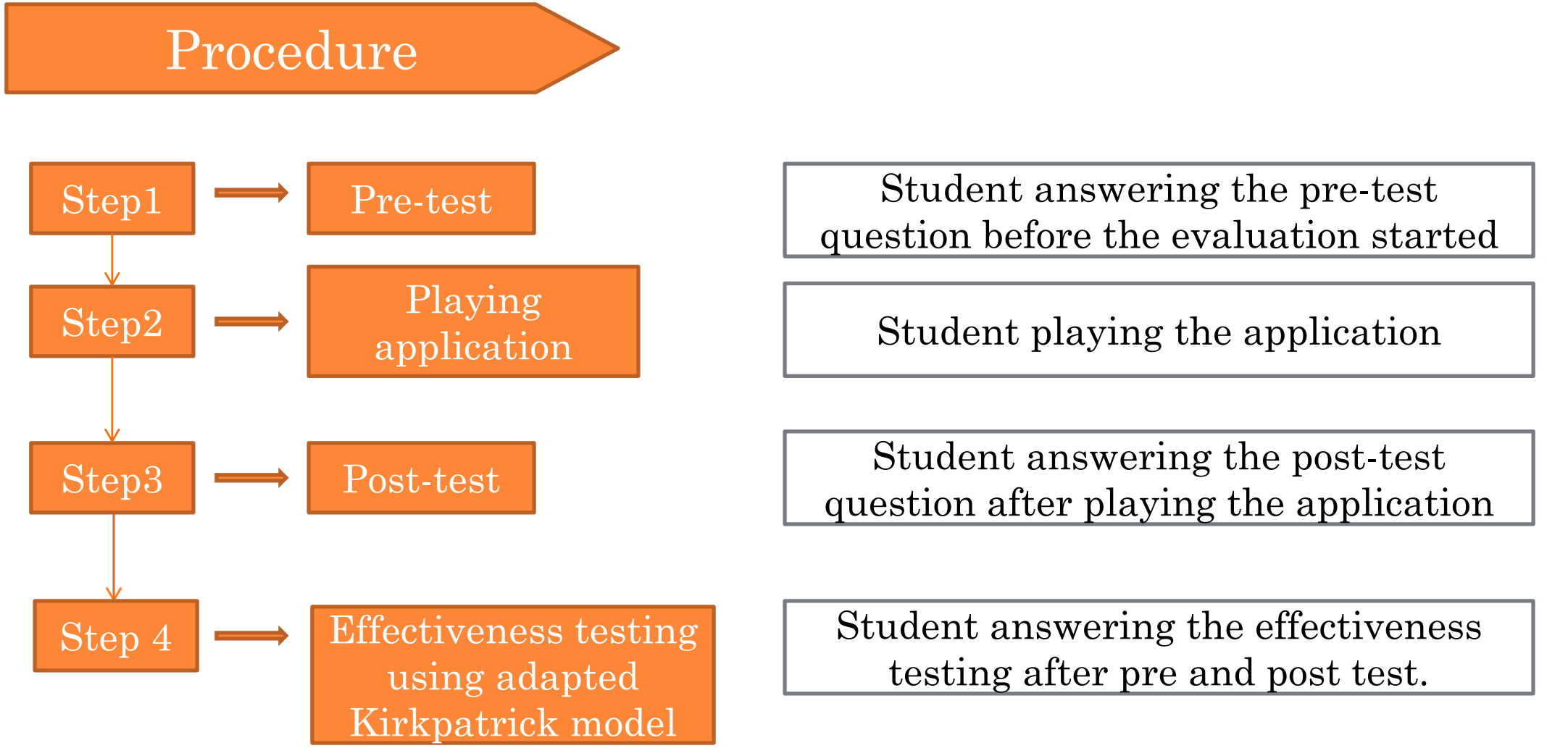
Questionnaires for Effectiveness Testing

- Part A : Demographic data
- Part B : Knowledge on VR
- Part C : Evaluate Reaction, Learning and behavior on contents and application

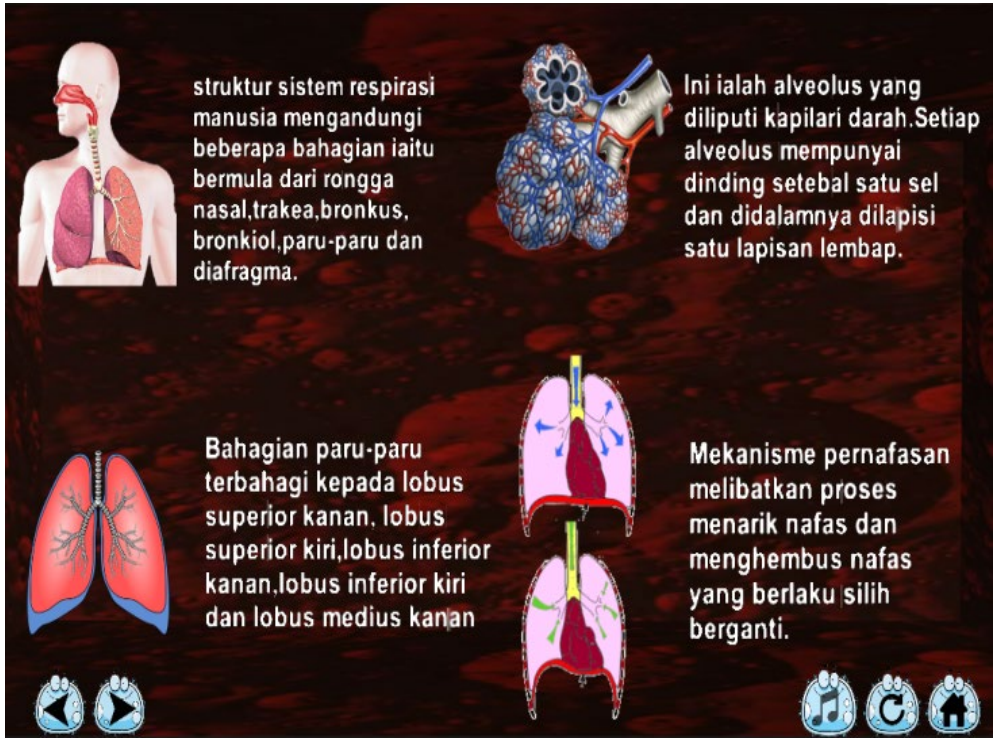
Questions with code reference

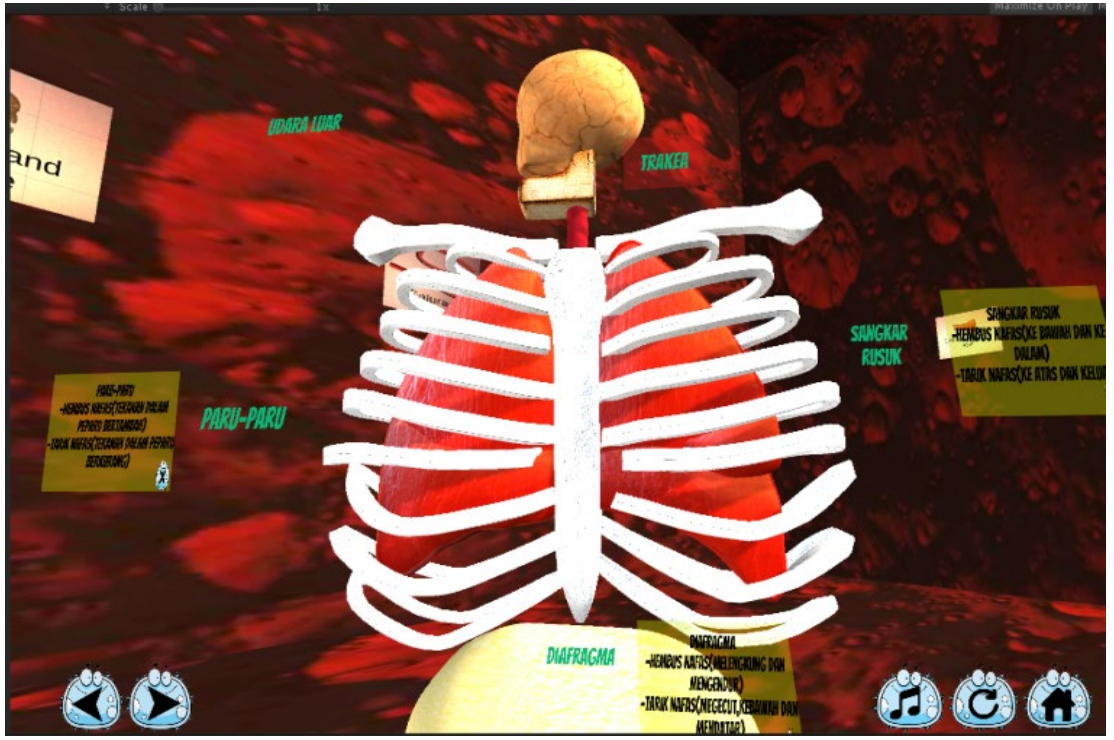
Element	Code	Item
Reaction	RE1	Aplikasi ini, membantu dalam mempelajari topik Sistem Respirasi Manusia.
	RE2	Aplikasi ini membantu untuk lebih fokus belajar.
	RE3	Aplikasi ini mudah untuk digunakan,
	RE4	Aplikasi ini sangat berguna di masa hadapan.
Learning	LE1	Aplikasi ini menjelaskan konsep dengan baik
	LE2	Aplikasi ini membantu saya mevisualisasi topik Sistem Respirasi Manusia.
	LE3	Aplikasi ini membantu dalam mengingati fakta yang penting
	LE4	Aplikasi ini membantu mengingati fakta menerusi warna yang menarik
User behavior	UB1	Teknologi ini membantu meningkatkan daya aktif ketika pembelajaran
	UB2	Saya berasa seronok belajar menggunakan teknologi virtual reality
	UB3	Aktiviti ini amat sesuai dengan tahap pelajar.
	UB4	Aplikasi ini membantu mendapatkan perkara yang ingin diketahui dengan mudah.

METHODOLOGY



Scene of application





Results and Discussion

Evaluation process

Result of pre-test and post-test

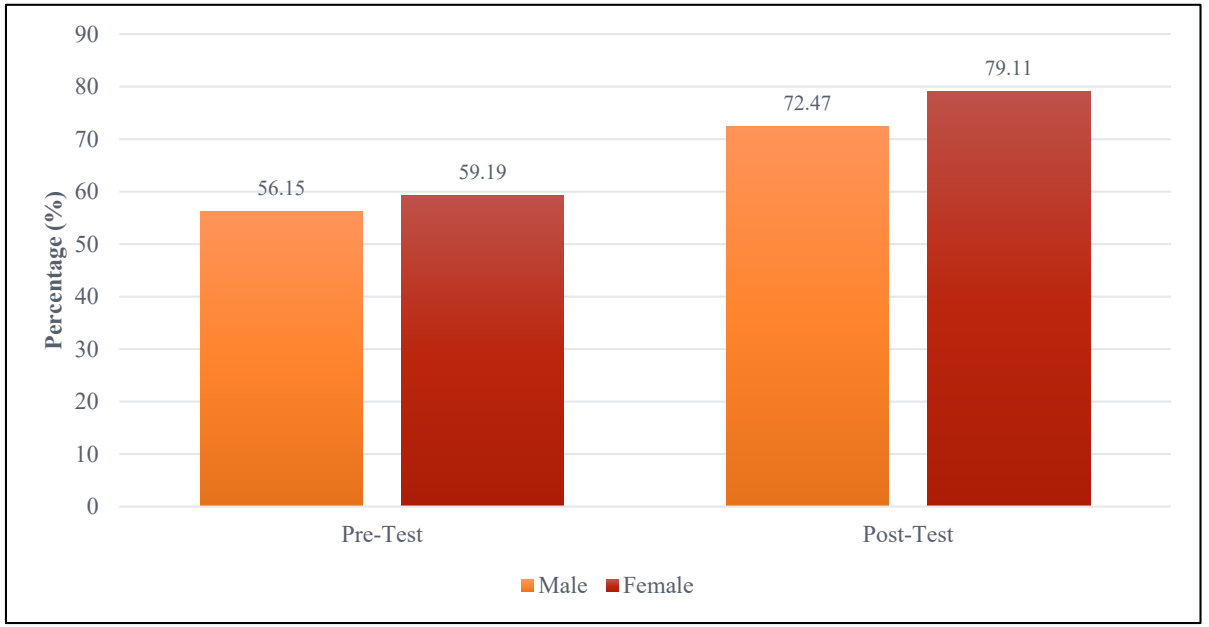
Pre-test

Post-test

by gender

- Consists of 17 males and 18 females.
- Students choose the most suitable answer to examine the contents.
- To identify whether gender influences the performance or not.

Analysis :



Finding shows that gender not influences in terms of performance because of small differences.

RESULT OF LEARNING PROCESS

Total Means for each Category

Element	Item	Mean
Reaction	RE1	3.34
	RE2	3.60
	RE3	3.74
	RE4	3.29
Total Mean		**3.49**
Learning	LE1	3.77
	LE2	3.84
	LE3	3.82
	LE4	3.59
Total Mean		**3.76**
User behavior	UB1	3.55
	UB2	3.70
	UB3	3.93
	UB4	3.06
Total Mean		**3.56**
Overall		**3.60**
% of Overall	(3.60/5) * 100	72%

- The highest total means is in Learning elements : 3.76.
- It proves that the V-HURESYS is an effective learning aid in enhancing students' understanding of Human Resporatory System.

- The total means of students' behavior is 3.56.
- It coherent with the aim of this research to assist the learning process to become more interactive so students will be able to understand and visualize the topic studied.

- The total means of students' reaction is 3.49.
- It shows that students provide a positive feedback on this teaching aid in acquiring knowledge of Human Respiratory System.

- The overall average is 3.60 which is 72%.
- It demonstrates that students agree the V-HURESYS application is an effective aid.

Conclusion

- The Kirkpatrick model is the most suitable model to examine the application's effectivenes as well as a pre-test and post-test questions.
- The evaluation result indicated; it was found that this application was effective in students to learn the Human Respiratory System.
- Feedback evaluation received indicated that students preferred to used V-HURESYS application in gaining knowledge about Human Respiratory System.