Using Janus VR with Oculus Rift to enhance Second Language Learning:
Analyze the Correlation Between the Sense of Immersion and
Learning Second Languages

by

Yoshinobu Nakada

A CAPSTONE PROJECT

submitted in partial fulfillment of the requirements for the acknowledgement

Honors Distinction

Social & Behavioral Sciences
School of Engineering, Mathematics, and Science

TYLER JUNIOR COLLEGE
Tyler, Texas

2016

Abstract:

I created a Virtual Reality (VR) website in Janus VR, a VR web browser, to enhance second language learnings. By using Skype and this VR website in Janus VR, it is possible to create a business to teach second languages, by which students do not need to make an appointment to meet up with teachers, and while students taking a lesson they can see teacher's avatars. This research is to find the correlation between the sense of immersion and learning second languages. In order to analyze the actual effect of learning second languages in a virtual reality setting, specifically Janus VR, an experiment was conducted to measure the following: change of the trade-off effect by learning vocabulary in virtual reality and the effect of the sense of immersion in learning second languages. Each subject was given two lectures to learn basic Japanese words. One lecture is the traditional online-chat based lesson in which subjects will talk to the teacher via Skype. The other lecture is taught in one of Janus VR's website I created specifically for learning Japanese. In this environment, subjects talked to the teacher's avatar via Skype. After each lecture, a short quiz is taken by subjects to compare respective lectures; the online-chat based lecture and Janus VR based lecture. Also, subjects were given an interview to evaluate the importance of 24/7 accessibility of the virtual reality web browser for continuous study.

1. Introduction

One of the most criticized points of conventional business education is probably the disconnection between theory and practice. The most promising feature of VR is that objects in the computer-simulated environment are visible, tangible, manipulatable and interactive, which often makes participants have the sense of "getting into" the environment and being unable to tell the virtuality from reality. In other words, to some degree, the artificial environment has the potential to compete with reality (Wang). With virtual reality (VR) technology, it is possible for students to practice what they learn in a VR environment. When learning second languages with the traditional education, students just learn basic grammar and vocabulary. This type of second language education tends to make students play a role of an observer in the class since there are multiple other students and not enough time to let each one to talk. Education in VR will be beneficial for those who cannot be adaptive to traditional instruction, such as exam and lecture based. Second language learners have not just to learn grammars passively, but to be actively involved. Based on Dewey's interest theory of learning (Dewey, 1913), a learning environment should be as immersive as possible so that it can supply students with the strong sense of presence and draw students into further engagement in the learning activity. In addition, those who have a higher sense of being in the learning environment gain more than those who just play the role of an observer (Moreno & Mayer, 2000). Since virtual reality technology make the learning environment quite immersive, it could compete with the traditional exam and lecture based education system. In this paragraph, the efficiency of education in virtual reality environments is explained. The next section starts from the neuroscience for linguistic learning and processing. Then it explains the best way to learn second languages from the neuroscientific

perspectives and ties it to the possibility of virtual reality education creating the ideal environment for learning second languages.

2. Review of the neuroscience for linguistic learning and processing and VR

According to Posner & Syder (1975), when humans deal with information in their brains, there are two stages: conscious attention and automatic activation. Students learning a second language at the beginning need to pay attention to what they try to say, and then after practicing, eventually they do not need to consciously pay attention. After all, they start to pay attention not to grammars and pronunciation, but to higher level cognitive activities. At this state, they can speak a second language fluently, and there will be less stress on grammar, pronunciation and so on. Thus, unconsciously they pay attention to more important information, so they can deal with language information efficiently. On the other hand, those who cannot speak a second language fluently spend most of the time attempting to understand the grammar and vocabulary and cannot understand them correctly, so they put most of their attention to less important information.

To understand a second language unconsciously or automatically, it is necessary to have background knowledge, so called schema. A schema is a pattern formed earlier in your experience. This schema theory introduced by Rumelhart & Ortony in 1997 explains that without schemas about a second language, the cognitive activities to understand second languages will stop and it is hard to keep paying attention to sentences. If that is the case, the efficiency of processing information in human's brain drops down dramatically, and in spite of the time spent to understand a sentence, learners cannot get much context of the sentence he/she try to understand. Therefore, in order to master second languages, it is crucial to transform knowledge and schemas of the second languages into long term memories and to process language information unconsciously. In other words, transforming schemas of second languages into long

term memories is the key to master second languages. In order to build up schemas of second languages, learners have to gain linguistic knowledge, such as grammar and pronunciation, social knowledge, and sometimes academic knowledge. Schemas promote the processing speed against second languages. Constructing the ideal schemas requires both top-down processing and bottom-up processing while understanding languages. Considering bottom-up processing, perception must be largely data-driven because it must accurately reflect events in the outside world. You interpret a scene mostly by information from the senses, not by your expectations. In many situations, however, your knowledge or expectations will influence perception. This is called schema-driven or top-down processing.

Considering the correlation between the linguistic neuroscience and learning second languages, long-term potentiation, LTP, is crucial phenomena in order to master second languages. The basic unit composing the human brain is neurons and they transmit information. Transmitting and processing information in neuro circuits made up by neurons that control human behavior and thought. Also, the structures and functions of neuro circuits change based on learning processes and experiences. Learning second languages will be apparently related to the structures and functions of neuro circuits. Hippocampus is considered to control learning and memorization, and when neurons in Hippocampus are stimulated in short terms and frequently, the efficiency of neuron transmitting signals improves for a couple of days. This phenomenon is called long-term potentiation: LTP. In other words, when human brain learns new things, because of LTP, the number of synapse increases and create new neuro circuits. Thus, it is easier to transmit information. This indicates that learning and experiencing new things continuously and frequently is the best way to learn second languages. Especially, not just memorize

vocabularies and grammars, but experience something new with second languages frequently is the key.

In the previous section, I talked about LTP, and in this section I will move to working memory. Working memory is somewhat different from short-term memory. Short-term memory temporarily holds information passively. On the other hand, working memory holds input information actively (芋坂, 2000: Wada, 2001). Baddeley (1986) explained that working memory is the system that holds and stores necessary information for cognitive activities, which control language comprehension, learning, and assumption. Considering how working memory processes language, working memory has two functions; storage and processing. Storage is the function that stores information temporarily and processing is the function to process input information and information taken from long-term memory. For instance, when one reads a text, working memory stores the information captured by eyes temporarily, and at the same time, it processes the information as well. Working memory has limited amount of space to store memory; when working memory tries to process input information, if it uses many spaces for storing information, there will be not enough space left for processing, and vice versa. Thus, there is a trade-off effect (芋坂, 2000). For example, when native English speakers listen to a lecture, their working memory can process words the speaker says easily. While they are listening to the speaker, their working memory stores the content and at the same time they can come up with questions against the content. However, if native English speakers listen to a lecture in foreign languages, their working memory has to use many spaces of its capacity for processing those foreign languages. Then, there will not be enough room for storing the lecture's content in the memory, and also it is hard to think about questions. This kind of situation, where working memory loses its balance between its storage and processing, is called the trade-off

effect (大石, 2006). When processing some second languages, usually top-down processing is not very efficient compared to when processing one's mother tongue because of lacking schemas and background knowledge about those second languages. Consequently, the trade-off effect occurs, and because of that, it is hard to learn second languages.

As mentioned above, reducing the trade-off effect will be the key to be a successful second language learner. According to Yorio (1971), when second language learners are reading a text, if there are some unknown vocabularies, the sentences one read will not be stored in working memory because most of the room in working memory are assigned to process the unknown vocabularies. Therefore, to reduce the trade-off effect, one has to build up adequate vocabulary as schemas, not just by memorization. Since working memory controls if learners can speak second languages fluently, in other words, it is possible to measure or rank the level of individual's second language mastery.

There is an interesting experiment conducted by Taiko Shimamoto. In the experiment, two group exist: those who have over 3000 words in their vocabulary, which does not include derivative words, called upper level, and those who have below 3000 word vocabularies, called lower level. Among the upper level students, there was strong correlation between the vocabulary and TOEFL score. In other words, the greater vocabulary they have, the higher TOEFL score they get. On the other hand, among the lower level students, there was not clear correlation. Therefore, Shimamoto states that one can start measuring or ranking the mastery of second language from 3000 words vocabularies. Considering the lower level students, when they read a text in which the rate of unknown vocabularies is only 5 % and try to answer the question that requires assumption, only 62% of students get the correct answer. Thus, those who do not have over 3000 word vocabularies have to focus on building up a stronger vocabulary. In

addition, Nation & Coady (1998) state that, in order to understand exact meanings of contexts, second language learners have to understand 98% of vocabulary in the text, and to do so, approximately 5000-word level of vocabulary is necessary.

3. The ideal VR environment for learning second languages

In the previous sections, what are important factors to master second languages are stated, such as the trade-off effect due to lack of vocabulary memorized as schemas, but not by just memorization. From this point, how to create the ideal VR environment for learning second languages will be discussed. The Institute for Organizational Behavior Research (組織行動研究所) run by recruit management Solutions Co in Japan conducted a research in order to find the major reasons for those who failed to keep studying second languages. The research targeted those who had been working for more than three years in a company and tried to learn English because of the increasing needs of being capable of speaking English with Japanese society getting more and more international. Their age ranges from 25 to 54 years old. During the research, they wrote down 3 major reasons why they fail to keep studying English in order from 1st to 3rd. The result is showed in the graph below.

The reason why subjects could not keep studying English
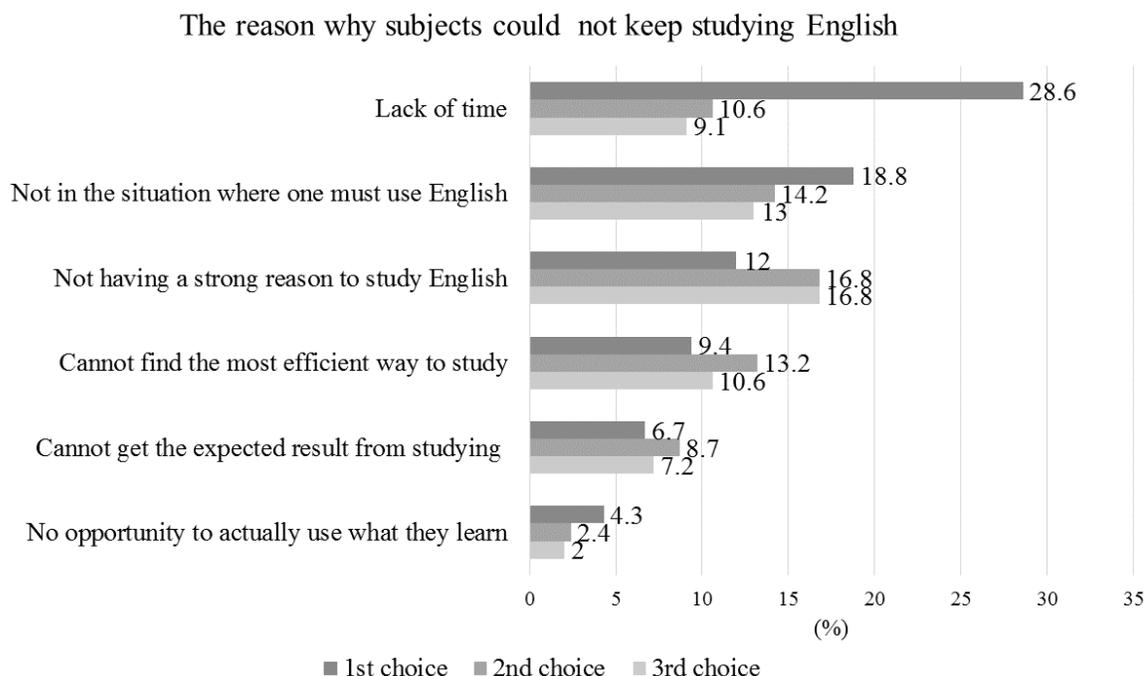
Graph 1. The reason why subjects could not keep studying English. Subjects wrote down 3 major reasons why they fail to keep studying English in order from 1st to 3rd. The darkest gray bar represented the 1st choice, the second darkest gray bar represented 2nd choice, and the lightest gray bar was for 3rd choice.

According to the graph, "not enough time available to learn English" gets the most votes as the 1st reason why they quit studying. Also, "not in the situation where one has to speak English inevitably" gets the most votes as the 2nd reason. Looking at other reasons, there are "no opportunity to use what one learns", "cannot find the efficient way to learn English", and "no clear goal". Considering those obstacles preventing one from keep studying English or any other second languages, the environment to learn second languages must be available to any time, so one can just walk in, instead of making an appointment, to have a lesson. Then, "not enough time available to learn English" will not be an issue since one can have a lesson any time even just for a couple of minutes. Also as mentioned previously, based on Dewey's interest theory of learning (Dewey, 1913), a learning environment should be as immersive as possible so that it can supply

students with the strong sense of presence and draw students into further engagement in the learning activity.

4. Janus VR – the VR web browser – for teaching second languages

In order to fulfill the feeling of immersion, 24/7 accessibility, and reducing the trade-off effect by teaching vocabulary with visual learning in virtual reality, Janus VR – the virtual reality base web browser – with using the Oculus Rift should be tested as a second language learning environment.

> Janus VR allows a spatial walk through the internet, inspired by the novel Snow Crash by Neal Stephenson who detailed a metaverse. The analogy is that webpages are rooms, and links connect rooms via portals (doorways which seamlessly connect rooms). (McCrae)

The merit of creating an environment for learning second languages in Janes VR, compared to creating that in an offline environment, is that students can just walk in to the lesson place without any appointment, and also Janus VR allows users to use the conventional 2-D web browser helping students to establish schema based vocabulary by showing them images while teaching unknown words.

5. Oculus Rift

The Rift, invented by Palmer Luckey, is the virtual reality headset, and its head tracking system synchronizes the what its display shows and one's head movement, which realizes the sense of immersion into VR environments.

6. Experiment

6-1. Purpose

In order to analyze the actual effect of learning second languages in a virtual reality setting, specifically Janus VR, an experiment was conducted to measure the following: change of the trade-off effect by learning vocabulary in virtual reality and the effect of the sense of immersion in learning second languages. Each subject was given two lectures to learn basic Japanese words. One lecture is the traditional online-chat based lesson in which subjects will talk to the teacher via Skype and the objective materials are on the screen of subject's PC. The other lecture is taught in one of Janus VR's website I created specifically for learning Japanese. In this environment, subjects talked to the teacher's avatar via Skype. After each lecture, a short quiz is taken by subjects to compare respective lectures; the online-chat based lecture and Janus VR based lecture. Also, subjects were given an interview to evaluate the importance of 24/7 accessibility of the virtual reality web browser for continuous study. Subjects also gave their input on learning in a virtual reality compared with the traditional online-chat based learning. The following factors are evaluated during the interview and lecture.

(1) Evaluate if subjects feel more positive about continuous second language study when the website of Janus VR I created is accessible 24/7 by walk-in.

(2) Evaluate the correlation between visual learning in VR and the efficiency of learning second languages.

(3) Evaluate the effect of the sense of immersion on learning second languages.

(4) Evaluate if subjects prefer the Janus VR based lecture to the online-chat based lecture and its reasons.

6-2. Method

1. Date of implementation, the research cooperator

The experiment was conducted from 20th to 27th in March 2016. Subjects were 22 randomly picked Tyler Junior College students, including 8 freshmen and 14 sophomores.

2. Procedure

They were given two types of lectures to learn basic Japanese grammar and vocabulary; Skype-chat based lecture and the lecture in the website I created by Janus VR. Each lecture lasted for 3 minutes, and before the lecture started, subjects had been informed that they were going to take a short quiz after each lecture. Between the short quiz and the lecture, a brief interview was given to subjects for exactly 2 minutes. In addition, after subjects took the short quiz, the rest of the interview was resumed. Because the grammar was similar in each lecture and each lesson was given back to back, the order in which the VR and Skype lesson was given alternated between subjects. A subject may score higher on the second quiz since they became more familiar with the lesson material and quiz format. So to prevent the misconception that one lecture may be more effective than the other, one subject would be given the VR lecture first and the Skype lecture second while the next subject would be given the Skype lecture first and the VR lecture second. This process was repeated in order.

3. Skype-chat based lecture

Subjects talked to the teacher through Skype but not with video chat, only voice chat. Google slide was used to present the content of the lecture. The content was how to say, "That is a pen" in Japanese and 5 basic vocabularies: pencil, flower, plant, head, and hair in Japanese. In order to explain the grammar, meaning of each word, and pronunciation, the slide the teacher used had

English and Japanese letters, and also English letters that helped subjects to pronounce Japanese properly. The process of the Skype-chat based lecture was that, at first the teacher explained how to pronounce, "That is a pen" in Japanese and let the subjects to say it by themselves. Then, its grammar was explained. Once again, the teacher asked the subjects to pronounce the sentence. Moving on to the vocabulary section, the teacher told the subjects how to pronounce each new vocabularies in Japanese and let them say those words. After finishing up all the 5 new vocabularies, the subjects were asked to review those words by pronouncing them one by one. At this point, the lecture was finished and the 2-miniutes-long interview was given, which asked subjects whether or not they had had any second languages learning experiences so far and what their grades were. After the interview, the short quiz was given orally, asking how to say, "That is a pen" in Japanese, and also how to say each vocabulary they learned in Japanese. The grammar section was worth 2 points, and each vocabulary was worth 1 point. Thus, the maximum score would be 7 points. The slide below was used in this experiment.

Slide 1. The content of Skype-chat based lecture

[grammar]	[New Vocabulary]		
That is a pen.	pencil	えんぴつ	enpitu
あれ は ペン です	flower	はな	hana
are wa pen desu	plant	しょくぶつ	shokubutsu
	head	あたま	atama
	hair	かみ	kami

4. The lecture with Janus VR

Subjects wore Oculus Rift Developer Kit 2 to dive into the Janus VR environment and went to the VR website I created, whose address is http://beta.vrsites.com/yoshi1579445/Japanese. The model of the website is the traditional Japanese high school classroom, and it has several windows through which subjects can see the Japanese countryside towns and rice fields in the sunset. The subjects talked to the teacher through Skype voice chatting. Since one of the Janus VR's features allows users to put the traditional 2D web browser in VR websites, the content of the lecture was presented by the 2D website in Janus VR. The avatar of subjects was default, and the model of teacher's avatar was a female Japanese high school student. The content of the lecture was about how to say, "This is a pen" in Japanese and 5 new basic vocabulary words like subjects did in the Skype lecture. The format of the slide the teacher used was the exact same, and the 5 vocabulary words taught in the Janus VR lecture were as easy as those of the Skype lecture, including table, chair, window, blackboard, and floor. The

process of the lecture is also almost the same, yet in the review section, subjects were asked to look at the object that represented the vocabulary they learned. For instance, when they reviewed how to say *table* in Japanese, since there were many tables in the VR Japanese classroom, they were asked to look at those tables and remembered how they pronounce the word and also the image of the vocabulary. Therefore, the difference between the Skype lecture and Janus VR lecture was that they could visually learn the new vocabulary, walk around the classroom, and actually see the teacher in front of them. After the lecture, subjects were given a 2-minutes-long interview and the short quiz like they had after the Skype lecture. The scores from the Skype and Janus VR lecture were compared to each other in order to analyze the effect of virtual reality on learning second languages. The slide below was used in the Janus VR lecture.

Slide 2. The content of Janus VR lecture

[grammar]

This is a pen.

これ は ペン です

kore   wa   pen   desu

[New Vocabulary]

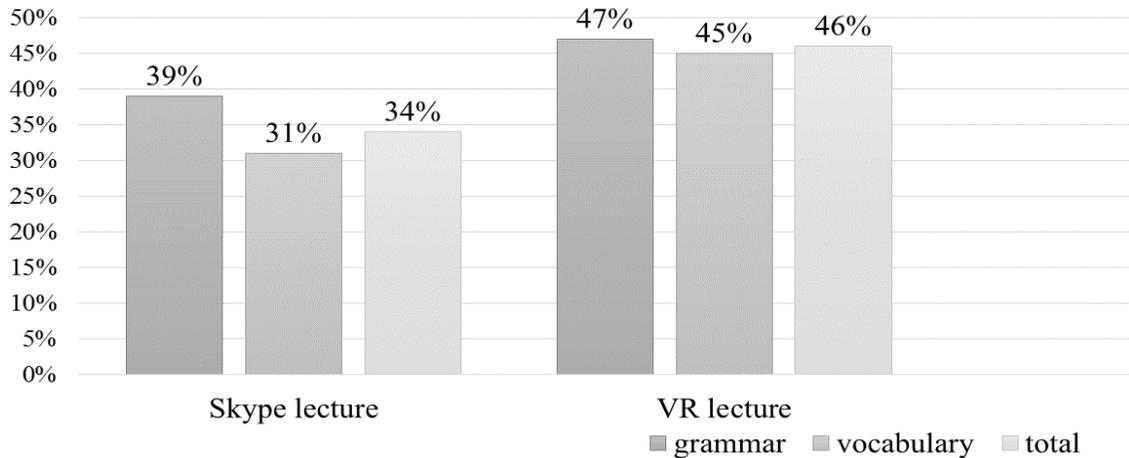| table | つくえ | tukue |
chair	いす	isu
classroom	きょうしつ	kyoushitu
blackboard	こくばん	kokuban
floor	ゆか	yuka

5. Interview

An interview was conducted before and after the quiz. During the interview after the lecture, mainly subjects were asked what their names were, what grade they were in, and if they had had any second language lecture before and how long. The interview conducted after the short quiz was for analyzing the effect of sense of immersion on learning second languages, whether or not subjects would feel like they could keep studying second languages with 24/7 accessible VR websites, and generally what they thought about the Janus VR lecture compared to the traditional online-chat based lecture. The following are the actual questions that were used during the interview after the short quiz.

- Did you have the feeling of immersion when you are in the VR website? Please pick your answer from strongly agree, agree, disagree, and strongly disagree.

- Do you think you can keep studying second languages in the VR lecture if it is 24/7 accessible? Please pick your answer from strongly agree, agree, disagree, and strongly disagree.

- If you have all the VR kit, do you want to take the lecture again? Please pick your answer from strongly agree, agree, disagree, and strongly disagree.

- Do you prefer to be taught a second language through VR or Skype chat?

6-3. Result

After getting all the data from each lecture, the scores of Skype and Janus VR lecture were compared so as to figure out the efficiency of the VR lecture. In graph 2, it showed that, in both of the grammar and vocabulary sections, subjects received higher scores with the Janus VR lecture than with the Skype lecture. Especially the percentage difference in the vocabulary section was more significant than in the grammar section.
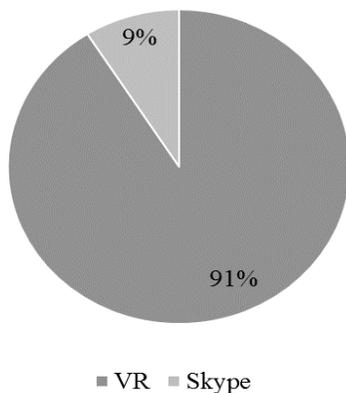
Score Comparison between
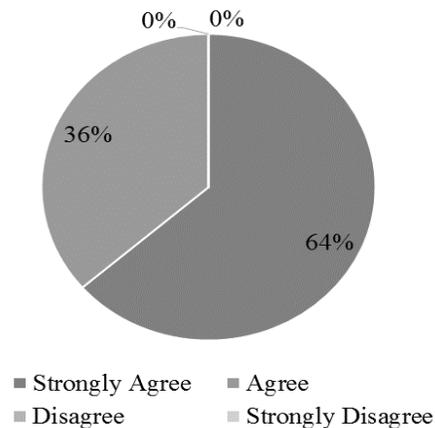## Skype and VR Lecture

Graph 2. Score comparison between Skype and VR lecture. The darkest gray bar represented the percentage of correct answer in the grammar section, the second darkest gray bar represented that of vocabulary, and the lightest gray bar was for the total score combined grammar and vocabulary.

The Chart 1 represents the statistic of the interview for each questions. The left pie chart in the Chart 1 shows that almost all of the subjects preferred to take Janus VR lecture, and only 9% of them answered that, because of the motion sickness caused by Oculus Rift, they choose the traditional Skype lecture.

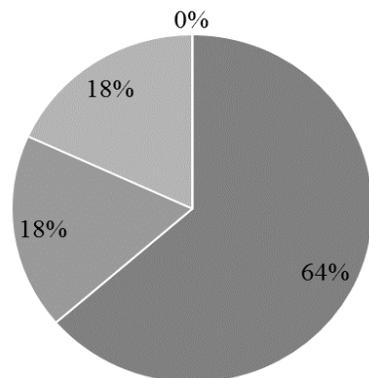Chat 1. The statistic of the interview conducted after the short quiz

In addition, subjects were asked the reason why they choose Janus VR lecture, and most of their answers were the following.

- "Since I am a visual learner, memorizing vocabulary by looking at the actual object was a lot easier than by just looking at the Google slides."
- "Simply Janus VR lecture was much more enjoyable because I could walk around the classroom and actually see my teacher. The Skype-chat based lecture was boring since it was just looking at Google slides."
- "I could actually engage in the lecture in Janus VR because it was more interactive than the Skype lecture."
- "I could focus more in the VR lecture than the Skype lecture."
- "The Janus VR lecture has a huge potential since the virtual reality technology has been developing so fast recently, and I just enjoyed a lot."

There were also suggestions from the subjects in order to improve the Janus, which I could categorize to three main opinions. The first one was that, since some people might have motion sickness, it is better to improve the VR head gear to reduce the effect. Secondly, since I used a traditional 2D web browser object in Janus VR, subjects were just looking at the slides in the 2D web browser during the lecture. Also, when they tried to remember new vocabulary words, they had to look back and forth because the word was on the slide and objects were around subjects. Therefore, some subjects said it is better to put the word right next to its actual object, so then students can see the object and its word simultaneously. Lastly, one of the subjects preferred to take the second language lecture with other students, so it would make the lecture more interactive.
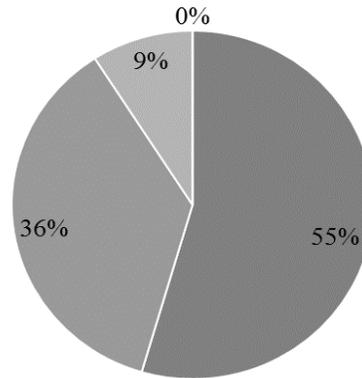
The right pie chart in Chart 1 certainly indicated that all of the subjects had more or less the feeling of immersion in the VR website. According to the two pie charts in Chart 2, total 82% of subjects agreed that they could keep studying second languages if there is a VR website teaching second languages that is 24/7 accessible with walk-in. However, there were still 18% of subjects who disagree with it. Those who agreed stated that, even when they are busy, due to the 24/7 accessibility of the VR website, they will be able to find time to take the lecture. On the other hand, there were some people saying that, since the VR head gear is too big and too many wires to bring, even though it is 24/7 accessible, they can take the class only at their houses.

Do you think you can keep studying second languages in the VR lecture?

0%
18%
18%
64%

■ Strongly Agree   ■ Agree
■ Disagree   ■ Strongly Disagree

If you have all the VR kit, do you want to take the lecture again?

0%
9%
36%
55%

■ Strongly Agree   ■ Agree
■ Disagree   ■ Strongly Disagree

Chat 2. The statistic of the interview conducted after the short quiz

6-4. Conclusion

Considering both Graph 2 and the right pie chart in Chart 1, three factors indicated that the sense of immersion enhanced subject's concentration that caused higher scores in both grammar and vocabulary quizzes, and visual learning in the Janus VR assisted memorizing new

vocabularies. One of the three factors is the interview showed that nearly 100% subjects experienced immersion shown by Chart 1, and also they could focus more in the VR website according to the interview. The second factor is subjects getting better grade for the VR lecture in the both grammar and vocabulary sections. Considering the first and second factors, the sense of immersion caused higher test score among subjects for VR. The third factors are the greater percentage difference of vocabulary section in the Graph 1, and the interview showing that memorizing vocabulary by looking at the actual object was a lot easier than by just looking at the Google slides. This implies that subjects had better grades in both grammar and vocabulary section, but moreover due to the visual learning of the VR website let subjects have even higher score in the vocabulary section, because the visual assist was applied to only vocabulary learning process.

The Chart 1 showed that students prefer the lecture in Janus VR to that via Skype-chat. Moreover, learning second languages in virtual reality is more efficient due to its immersion and visual learning. Also, learning new vocabularies by looking at the actual objects allows students to accumulate schema-based vocabulary, which reduces the trade-off effect mentioned in the introduction. Graph 1 displayed that, since the lack of time is the prime reason why people stop studying second languages, the learning system should give students a more flexible schedule. Currently, there are multiple online services teaching second languages, such as italki in the United States and RareJob in Japan. Those online voice-chat based classes let students have an appointment even 1 hour before the lesson starts. However, The Janus VR website based class is even better for scheduling, because it is 24/7 accessible and even allows students to walk in to a class. Therefore, learning second languages in Janus VR can alternate the traditional online voice-chat based class in the future.

7. Source Code of the VR Website I created

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<Object id="curtain1" pos="0.44144 0.696299 4.075768" scale="1 1 1" xdir="-1 0 0" ydir="0 1 0" zdir="0 0 1"/>
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<Object id="desk" pos="-3.613132 0.01182686 -3.613626" scale="1 0.825 1" xdir="1.192093E-07 0 1" ydir="0 1 0" zdir="1 0 -1.192093E-07"/>
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<Object id="desk" pos="3.120302 0.01182687 2.086043" scale="1 0.825 1" xdir="1.192093E-07 0 1" ydir="0 1 0" zdir="1 0 -1.192093E-07"/>
<Object id="desk" pos="-2.33953 0.01182686 -2.127531" scale="1 0.825 1" xdir="1.192093E-07 0 1" ydir="0 1 0" zdir="1 0 -1.192093E-07"/>
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<Object id="desk" pos="3.046922 0.01182686 -3.608974" scale="1 0.825 1" xdir="1.192093E-07 0 1" ydir="0 1 0" zdir="1 0 -1.192093E-07"/>
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<Object id="win3" pos="1.518766 0.8979952 4.301027" scale="0.993226 1 1" xdir="1 0 0" ydir="0 1 0" zdir="0 0 -1"/>
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<Object id="eraser" pos="-5.979901 1.129324 0.6587148" scale="1.1707 1 1" xdir="0.591942 -0.1557262 -0.7907933" ydir="-0.7528683 -0.4571128 -0.473537" zdir="0.2877396 -0.8756697 0.3878255"/>
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<Object id="win3" pos="1.966641 0 -4.258305" scale="1.062889 1 1" xdir="-1 0 0" ydir="0 1 0" zdir="0 0 1"/>
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<Object id="eraser" pos="-6.025309 1.132592 0.9755974" scale="1.1707 1 1" xdir="9.592623E-08 -2.831221E-07 -1" ydir="0.2408751 0.9705561 -2.607703E-07" zdir="-0.9705562 0.2408751 -1.620501E-07"/>

<Object id="b1" pos="-2.258218 0.7874225 1.93112" scale="1 1 1" xdir="-0.5084847 0 -0.8610711" ydir="0 1 0" zdir="-0.8610711 0 0.5084847"/>

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<Object id="rail" pos="-3.584738 3.145338 4.101098" scale="1 1 1" xdir="-1 0 0" ydir="0 1 0" zdir="0 0 1"/>
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<Object id="curtain1" pos="4.546021 0.696299 4.075768" scale="1 1 1" xdir="-1 0 0" ydir="0 1 0" zdir="0 0 1"/>
<Object id="trashbox" pos="-5.685173 0.003439744 -3.449453" scale="1.000001 1 1.000001" xdir="0.8698353 0 -0.4933429" ydir="0 1 0" zdir="-0.4933429 0 -0.8698353"/>

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<Object id="board1" pos="-6.155775 1.062932 2.557518" scale="1 1 1" xdir="1.192093E-07 0 1" ydir="0 1 0" zdir="1 0 -1.192093E-07"/>
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<Object id="cleaner" pos="5.462754 0.9525427 2.759172" scale="1.165749 1.165749 1.165749" xdir="-0.5378323 0 -0.8430519" ydir="0 1 0" zdir="-0.8430519 0 0.5378323"/>
<Object id="b2" pos="-2.407463 0.7848622 2.125692" scale="1 1 1" xdir="0.1015048 0 -0.9948351" ydir="0 1 0" zdir="-0.9948351 0 -0.1015048"/>
<Object id="desk" pos="-3.613132 0.01182686 -2.123682" scale="1 0.825 1" xdir="1.192093E-07 0 1" ydir="0 1 0" zdir="1 0 -1.192093E-07"/>
<Object id="chalk_white" pos="-6.068009 1.112718 -1.765733" scale="1 1 1" xdir="-1 0 0" ydir="0 -1.192093E-07 1" zdir="0 -1 -1.192093E-07"/>
<Object id="clock" pos="5.707613 2.990145 0" scale="1 1 1" xdir="1.192093E-07 0 -1" ydir="0 1 0" zdir="-1 0 -1.192093E-07"/>
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</FireBoxRoom>
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