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# The Interaction between Virtual Reality Glasses Tracking Types and Cognitive Style to Develop English Vocabulary Skills and Immersion among Primary Stages Pupils with Learning Difficulties

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## Abstract

This paper focuses on measuring the impact of interaction between virtual reality glasses tracking types (Positional - Rotational) and cognitive styles (Impulsivity - Reflectivity) to develop English vocabulary skills among primary-stage pupils with learning difficulties. Five instruments were utilized in the research process and the results reported the test. English vocabulary checklists were employed to identify the vocabulary that will be used in the course of the research. The test are as follows: an English test to identify the learning difficulties of students in the English Language, the test of mental ability to identify the IQ mean scores of students, a standard test of Kagan to measure the cognitive style (Impulsivity - Reflectivity), and pre and post-English vocabulary achievement test. However, immersion scale and the suggested English vocabulary skills program depend on positional - rotational

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tracking type. The participants were students in grade five and their number is 89 from the primary stage at Tarek Ibn Zaid school, Minia, Egypt. Using four groups of quasi-experimental design, the research followed applying tests of mental ability, English test to identify difficulties, and Cognitive style test of Kagan. It also followed a pre and post-testing procedure before and after applying for the virtual reality program and applying the immersion scale at the end of the program. The quantitative results of the study indicated that there was no interaction between virtual reality glasses tracking type (Positional - Rotational) because of the lack of direct relationship between cognitive style and virtual reality glasses tracking type, especially in immersion with learning and acquiring English vocabulary skills, and that there is no preferred pattern for virtual reality glasses tracking type with one of the cognitive methods that was dealt with in the research. This is most especially in learning and acquiring English vocabulary skills.

**Keywords:** Virtual Reality- (VR), VR Glasses, Pupils with Learning Difficulties, Impulsivity - Reflectivity, Cognitive Style – Tracking Type, English Vocabulary, Immersion

## Introduction

English is the second official language in Egypt, and every pupil has to study it. Learning the English Language depends on four skills. However, if the student wants to learn and use these skills, the learner has to learn vocabulary and grammar to build the sentence structure during speaking, listening, reading, and writing. Learning English vocabulary is a challenge for average students, and it is an excellent dilemma for students who suffer from learning difficulties. Academic vocabulary studies give great attention to learners' learning difficulties and the general academic vocabulary is reflected in AWL. Vocabulary is the most significant component in learning it as a second language which is one of the crucial parts along with phonetics, pronunciation and grammar, which are considered a base for learning this new language (Yang & Dai, 2012).

However, it was evident that students have suffered from learning difficulties in the traditional environment. One of the most effective Educational environments is Virtual Reality. Research on VR was initially conducted. VR would be just another form of presenting multimedia educational content. As long as the principles for multimedia design are applied to its features, learning is likely to happen regardless of the effects of immersion and motivation. Despite being one of the few models used to understand vocabulary learning in a multimedia environment, presenting significant advances in the area, Mayer’s model is quite simple and limited for having excluded learners’ individual characteristics, such as attention,

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motivation, and learning styles among others, which directly influence information processing. Exploring these characteristics in the VR medium can be facilitated by its features.

For more illustration, the learning difficulties are caused by possible disorders in the brain's functions. As a result, it is not considered retardation, educational deprivation or any type of disabilities whether visual, auditory, or physical. However, it will appear incapable of reading, writing, spelling, listening, speaking, and mathematical processes.

One of the primary things the users have to give considerable attention to is tracking because the physical movements are basic to VR headsets. Otherwise, it is considered an obstacle to the consumer electronics world because of the hardware components, measurement units (IMUs), cameras, and the cost due to the smartphone industry. There are three types of VR tracking systems based on what is being tracked. This research has positional-rotational tracking types that depend on the student's movement. The teacher is responsible for directing and illustrating the student in the classroom through several questions.

Human personalities have different attitudes that reflect on behaviour, and in some cases one of the standard cognitive styles is impulsivity and reflectivity. Psychological studies have given both of them a specific definition according to the degree of behaviour in cognitive domains. For example, a person who tends to make and give quick gambling (impulsive) is a person who takes calculated answers or makes a slower decision (reflective) (Brown, 1994). Furthermore, in this research, the students were divided into two (Impulsivity - Reflectivity) to measure the differences between them.

An immersive virtual environment (IVE) is defined as the space where the users can be inside, and at the same time, we can increase the sense of presence being with it (Bailenson, Yee & Laundlad, 2008). Furthermore, this contains synthetic sensory information that gets a continuous stream of stimuli which involves the illusory perception of being enclosed with and interacting with the natural environment (Smith, 2015; Loomis, 1999). According to Fallman, Backman and Holmlund (1999), Virtual Reality is classified by the user's level of Immersion and interaction.

## The Problem of the Research

The problem of the research was derived from the following two resources:

**a) Researcher's Experience**

The researcher has worked as an English Language teacher for three years at the primary stages. During this period, she has faced many problems related to English Vocabulary skills, especially with those students who suffered from learning difficulties. The pupils could not connect between the

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word and its picture. They found it difficult to answer the questions or use these words in speaking or writing.

**b) Literature Reviews**

Learning the vocabulary usually causes a heavy burden on the learners. In other words, languages are productive and they continually create and add new words to their vocabulary stock. Oxford (1990) argues that generally, no rules are followed in learning the vocabulary used in grammar. Students usually encounter hundreds of words that they need to learn and practice during their studies. Rohmatillah (2017) investigated the difficulties faced by students in learning English vocabulary. Internal factors explained by Slameto (2013), cited in Alfilail (2015), consists of several factors like intelligence, aptitude, and others. Besides internal factors that influence learning, external factors also significantly influence, such as family, school, and environmental factors.

## 3. Objectives of the Research

This research aims to solve the problems of cognitive and implement the English vocabulary skills in the pupils of primary stages and according to the following:

1. To identify the English vocabulary skills of the primary students.
2. To identify the proposed design of using virtual reality glasses based on (Positional – Rotational) styles.
3. To investigate the effectiveness of using virtual reality glasses in developing the cognitive sides of English vocabulary skills in primary stages.
4. To investigate the effectiveness of using virtual reality glasses in developing the implement sides to solve English vocabulary skills of primary stages and the effectiveness of immersion.

## 4. Significance of the Problem

For the Student: This research aimed to design a model of virtual reality glasses that helps students link between the vocabulary they have learned and the natural world through pictures, videos, games, presentations, and the sound of these words. Furthermore, it helps to identify the relationship between English vocabulary skills and cognitive style (Impulsivity - Reflectivity) for students' primary stages.

For the Teacher: The most important thing for teachers is the way of teaching because they can identify exciting ways of teaching. To illustrate this, when students like a classroom and the different teaching methods, they will communicate and do their best to collect information and learn the vocabulary.

For Curriculum Designers: It gives curriculum designers the ability to design effectively in new ways because the traditional curriculum does not

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give them considerable ability to create something. However, for VR glasses, it will be different to immerse into the educational process.

For EFL Research: It may provide future studies on the development of language skills through an adaptive learning system.

## 5. Questions of the Research

1. What English vocabulary skills are needed for pupils with learning difficulties at the primary stages?
2. What is the proposed design of virtual reality glasses based on (Rotational – Positional) tracking types and cognitive style (Impulsivity - Reflectivity) to develop English vocabulary skills and immersion among primary stages pupils with learning difficulties?
3. What is the effect of Virtual reality glasses tracking types (Positional - Rotational) pattern differences to develop English vocabulary skills among primary stages pupils with learning difficulties?
4. What is the effect on developing cognitive style (Impulsivity-Reflectivity) differences in developing English vocabulary skills needed among primary stages pupils with learning difficulties?
5. What is the core interaction between Virtual reality glasses tracking types (Positional - Rotational) and cognitive style (Impulsivity-Reflectivity) to develop English vocabulary skills among primary stages pupils with learning difficulties?
6. What is the effect of Virtual reality glasses tracking types (Positional - Rotational) pattern differences to develop immersion among primary stages pupils with learning difficulties?
7. What effect does cognitive style (Impulsivity-Reflectivity) differ in developing immersion among primary stages pupils with learning difficulties?
8. What is the interaction between Virtual reality glasses tracking types (Positional -Rotational) and cognitive style (Impulsivity-Reflectivity) to develop immersion among primary stages pupils with learning difficulties?

## 6. Hypotheses of the Research

1. There would be no statistically significant differences on the level of 0.05 between mean scores of primary stage pupils with learning difficulties for the group which studied with positional virtual reality glasses tracking and the group which studied with rotational virtual reality glasses tracking in the post-English vocabulary skills test.
2. There would be no statistically significant differences on the level of 0.05 between mean scores of primary stage pupils with learning

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difficulties in the impulsive group and reflective group in a post-English vocabulary skills test.

3. There would be no statistically significant differences on the level of 0.05 between mean scores of primary stage pupils with learning difficulties in post-English vocabulary skills test for the four experimental groups due to the interaction between Virtual reality glasses tracking type and cognitive style.
4. There would be no statistically significant differences on the level of 0.05 between mean scores of primary stage pupils with learning difficulties for the group studied with positional virtual reality glasses tracking and the group studied with rotational virtual reality glasses tracking in post immersion scale application.
5. There would be no statistically significant differences on the level of 0.05 between mean scores of primary stage pupils with learning difficulties in the impulsive group and reflective group in post immersion scale application.
6. There would be no statistically significant differences on the level of 0.05 between mean scores of primary stage pupils with learning difficulties in post immersion scale application test for the four experimental groups due to the interaction between Virtual reality glasses tracking type and cognitive style.

## 7. Research Design

The research followed a quasi-experimental design that identified comparison groups (four groups) who received the same treatment, and the differences were returned to the tracking type and cognitive style. Each group took a pre\post test and the immersion test was for all groups at the end. The research sample was chosen after the mental ability exam and English Language test, which identified students who had learning difficulties from Tarek Ibn Zeyad Primary Stages School. They were from grade five and were chosen from all grade five classes of the school. Furthermore, they took Kagan test to identify the Matching Familiar Figures test cognitive style. The last stage involves randomly dividing the cognitive style groups into four groups. Using the results of the instruments, the scores of participants were compared and statistically analyzed using SPSS program (Mean differences measurement using T-test) to verify the differences in the mean scores before and after running the program. The instructional design model is ADDID.

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## 10. Theoretical Framework

### 10.1. The Learning Theories and VR in Education

Firstly, constructivism theory is defined as applying learning theory and Epistemology. The main aim of these two theories is about learning to students, but it is essential to start by defining constructivism.

This theory is about organizing the teaching environment with the objects suitable for engaging the learner with content which is the main crucial thing in the learning process. Nonetheless, there are some main principles of learning.

1. Learning is an active process in which the sensory of the learner input and constructs meaning out of it so as to lead us to the fact that learning puts the learner and engages him/her in the world of teaching.
2. The constructivist theory includes constructing systems and constructing meaning. For example, if the learner wants to learn about the definitions of something in science, it is possible to give them the meaning, and then provide them with the system of using it and applying the information in science.
3. Learning includes language because there is research which approves that people, while studying and learning, talk and use this in education (Vigotsky).
4. The learning process takes time, and to illustrate that, the teachers or parents cannot put a specific time, i.e., it cannot happen in 5 or 10 minutes because it depends on individual differences. The learner can feel this when it reflects his/her attitude in life.

From the previous references, it has been understood that this theory aims to organize the environment which puts both teacher and student in the correct world to interact with each other.

## 2. VR in Language Education

Virtual Reality is considered one of the most critical technologies in education. However, it needs some steps for the learners to achieve their learning goals.

Institutions are the primary place where this process will be applied, but at the same time, we should admit that VR is expensive. When we decide to start work with it, we have to invest money to buy these instruments, such as VR glasses and the programming we can apply.

Teachers need a great effort to import this technology into the classrooms. However, their work will start from preparing the material in its traditional ways to programming and introducing it so that students can interact with it. The second and most crucial step is that when the instructor

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gets into the classroom, he/ she should prepare the arrangement of teaching the lesson to make students excited about what they will learn.

Learners in the educational process are the receivers of the information. However, in the case of VR, they cannot only receive but can also interact and immerse themselves into the new environment.

## 3. Virtual Reality Glasses in Teaching

Five programs prepare teachers to help them use virtual reality technology in schools, colleges, and educational institutions at the end of the programme. These programmes have introduced more than 100 teachers.

1. VRRV/Nebraska, Phase III
2. Educators' VR Series
3. Virtual Reality in the schools
4. Virtual Education – Science and Math (VESAMOTEX)
5. VR Concentration, M.A in Education

At the beginning of the third phase in Nebraska, the aim to support and prepare the teachers to use VR for constructivist learning activities. This place has introduced workshops for educators and teachers based on desktop computing.

Furthermore, the teachers should choose the correct method which is suitable to their aims in the classroom, and these goals depend on the curriculum the pupil is going to study and understand.

## 4. Virtual Reality and Motivation

The learning process depends on how to motivate students because they demonstrate high learning efficiency, and the primary target for most teachers is to motivate their students. Thus, if they like learning, they will understand and accomplish the content which they have studied. In addition, many teachers prepare techniques, active learning, and games to motive them. In order to increase these techniques, they use Virtual Reality. There are specific techniques to design and achieve an excellent curriculum and Virtual Learning Environment (VLE), and this approach helps people or individuals acquire knowledge (Mayar, 2003).

## 11. Procedures

The following procedures will be used by the researcher:

1. Studying and reviewing the studies related to English vocabulary skills, virtual Reality, virtual reality glasses, and positional and rotational methods.

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2. The researcher designed a checklist of English vocabulary skills according to the English curriculum for the primary stages who suffer from learning difficulties.
3. Prepare Mental Ability test to ensure that the research sample are for pupils with learning difficulties (Farouk Mousa, 1984).
4. Applying English tests to identify the learning difficulties of students in the English Language.
5. Designing pre/post-test to test the checklist of English vocabulary skills.
6. Designing the English vocabulary curriculum that will represent the technical part of the research, and the researcher has to choose a suitable educational model to follow.
7. The researcher divided the research sample into two groups known as experimental and control groups.
8. Conducting the pre/post-test tests for these groups.
9. Conducting the treatment on the experimental groups.
10. Conducting the post-test for these groups.
11. Conducting immersion scales for these groups.
12. Analyzing results.

**Table 1.** Experimental Design

<table>
<tr><th>Variables</th><td rowspan="3">Pre-test Achievement test</td><th>Group 1</th><th>Group 2</th><td rowspan="4">Post Achievement Test</td></tr>
<tr><td>Tracking types (Rotational-Positional)</td><td>Reflective positional</td><td>Reflective rotational</td></tr>
<tr><td rowspan="2">Cognitive styles (Impulsivity-Reflectivity)</td><th>Group 3</th><th>Group 4</th></tr>
<tr><td>Impulsive Positional</td><td>Impulsive Rotational</td></tr>
</table>

## 8. Instrumentation

### 1. Mental Ability Test

This test aimed to identify students' learning difficulties through the number of questions. Ninety questions from different subjects were selected based on the age of students between 9 to 11 years. This test was validated in terms of validity and reliability coefficient. The reliability of the IQ test has a high degree of reliability. Thus, the reliability coefficient of alpha Cronbach was 0.958, and this is a high-reliability value that indicates the validity of testing IQ for application.

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**2. Matching Familiar Figures Test (MFFT)**

The vocabulary of this test generally consists of shapes that are familiar to the subjects. Each item consists of a standard form and a group of shapes that differ from the basic shape, except for one of them that completely matches it. This test aimed to determine the impulsive and reflective students. Furthermore, this test was validated in terms of validity and reliability coefficient.

The reliability of Elfaramawy Learning Style test has a high degree of reliability. Thus, the reliability coefficient of alpha Cronbach was 0.888, and this is a high-reliability value that indicates the validity of testing Learning Style for application.

**3. English Vocabulary Checklist**

This checklist has been designed to collect the words and divide them into four parts of a speech namely; nouns, verbs, adjectives, and prepositions which the researcher wanted to put in the program. The resource of this vocabulary is the time for English curriculum.

**English Vocabulary Achievement Test 4**

The researcher prepared the English vocabulary test and the primary purpose was to measure the students' achievement in English vocabulary skills. The researcher has used this test as a pre-test which was applied before the experiment, and as a post-test which has been applied after the experiment. The source of this test is the curriculum of time for English designed for grade five. This test was validated in terms of validity and reliability coefficient. The reliability of the English Vocabulary skills test has a high degree of reliability. Thus, the reliability coefficient of alpha Cronbach was 0.867, and this is a high-reliability value that indicates the validity of testing English Vocabulary skills for application.

**5. The Immersion Scale**

This test aimed to measure the students' immersion in the virtual reality glasses program to develop English vocabulary skills for learning difficulties experienced by students with tracking type (Rotational - Positional). This is done in order to know the program's reflection on the students and how they are immersed in this program. This test was validated in terms of validity and reliability coefficient. The reliability of the Immersion Scale has a high degree of reliability. Thus, the reliability coefficient of alpha Cronbach was 0.911, and this is a high-reliability value that indicates the validity of testing the Immersion Scale for application.

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## 9. Participants

Eighty-nine students from grade five were chosen from Tarek Ibn Zeyad primary school. Mental ability test was given to one hundred and twenty, and the number of students who had learning difficulties was seventy students. Furthermore, the students took Matching Familiar Figures test for Kagan for primary school children. In addition, Dr. Hamdy Elfarmawy translated the copy and they were assigned to two groups.

**Table 2.**

| No. Participants | The experimental group |
|---|---|
| 22 | Reflective - Positional |
| 21 | Reflective- Rotational |
| 23 | Impulsive - Positional |
| 23 | Impulsive- Rotational |

## 12. Results and Discussion

The results obtained are the findings of the research, which aimed to identify the interaction between Virtual reality glasses tracking types (Positional - Rotational) and cognitive style (Impulsivity-Reflectivity) to develop English vocabulary skills and immersion among primary stages pupils with learning difficulties, throw post application of English vocabulary skills test, and Immersion Scale for the research groups, This is after measuring students IQ through Mousa (1984) mental ability test and determining their Cognitive style (Impulsivity-Reflectivity) through Elfaramawy Shapes pairing test. Furthermore, this also involves using the appropriate statistical methods based on the SPSS statistical processing program to verify the integrity of the research tools and draw conclusions. The following is a presentation of the research results which show the statistical analysis of the effect of interaction between Virtual reality glasses tracking types and Cognitive style to develop English vocabulary skills. Table 3 shows the mean scores of the different groups in the post application of the English vocabulary test in addition to the standard deviation for each group.

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**Table 3.** Mean Scores and Standard Deviation of Primary Pupils in Post Application of English Vocabulary Skills Test (Maximum Grade = 40)

| Variable | | Virtual reality glasses tracking types | | Total |
|---|---|---|---|---|
| | | Positional | Rotational | |
| Cognitive style | Impulsivity | Mean= 33.52<br>St.dv.= 1.082<br>N= 23 | Mean= 31.30<br>St.dv.= .926<br>N= 23 | Mean= 32.41<br>St.dv.= 1.499<br>N= 46 |
| | Reflectivity | Mean= 34.18<br>St.dv.= 1.140<br>N= 22 | Mean= 32.48<br>St.dv.= .750<br>N= 21 | Mean= 33.35<br>St.dv.= 1.289<br>N= 43 |
| Total | | Mean= 33.84<br>St.dv.= 1.147<br>N= 45 | Mean= 31.86<br>St.dv.= 1.025<br>N= 44 | Mean= 32.87<br>St.dv.= 1.471<br>N= 89 |

It is evident from Table 3 that:

1. The mean score of the positional group is higher than the mean score of the rotational group in the English Vocabulary skills test.
2. The mean score of the Reflectivity group is higher than the mean score of the Impulsivity group in the English Vocabulary skills test.

**Table 4.** Two-way Analysis of Variance of the Impact of the Interaction between Virtual Reality Glasses Tracking Types (positional -rotational) and Cognitive Style (Impulsivity-Reflectivity) on English Vocabulary Skills Test

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Virtual reality glasses tracking type | 85.486 | 1 | 85.486 | 87.420 | .000 |
| Cognitive Style | 18.641 | 1 | 18.641 | 19.063 | .000 |
| Virtual reality glasses tracking type * cognitive Style | 1.455 | 1 | 1.455 | 1.488 | .226 |
| Error | 83.120 | 85 | .978 | | |
| Total | 96321.000 | 89 | | | |
| Corrected Total | 190.382 | 88 | | | |

Table 4 shows the significance of each of the following:

1. The difference between the mean scores of primary school pupils in the positional Virtual reality glasses tracking group and the mean scores of primary school pupils in the group of rotational Virtual reality glasses tracking.
2. The difference between the mean scores of primary school pupils in the group of Impulsivity cognitive style and the group of Reflectivity cognitive style interaction between Virtual reality glasses tracking types (positional -rotational) and Cognitive style (Impulsivity-Reflectivity) to develop English vocabulary skills among primary stages pupils with learning difficulties.

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From Table 4, it is evident that the value of "F" is 87.420 for the Virtual reality glasses tracking type variable. This is statistically significant at the level of 0.05 where the significance value is 0. 000 and this is smaller than 0.05. However, there is a statistically significant difference at the level of 0.05 between mean scores of primary stage pupils with learning difficulties for the group which studied with positional virtual reality glasses tracking and the group which studied with rotational virtual reality glasses tracking in post-English vocabulary skills test. Thus, the first hypothesis was rejected.

Furthermore, from Table 4, it is evident that the value of "F" is 19.063 for the cognitive style type variable. This is statistically significant at the level of 0.05 where the significance value is 0. 000 and this is smaller than 0.05. However, there is a statistically significant difference at the level of 0.05 between mean scores of primary stage pupils with learning difficulties in impulsive group and reflective group in post-English vocabulary skills test. Thus, the second hypothesis was rejected too.

In addition, from Table 4, it is evident that the value of "F" is 1.488 for the interaction between virtual reality glasses tracking type and cognitive style. This is not statistically significant at the level of 0.05 where the significance value is 0. 226 and this is greater than 0.05. However, there are no statistically significant differences at the level of 0.05 between mean scores of primary stage pupils with learning difficulties in post-English vocabulary skills test for the four experimental groups due to the effect of interaction between Virtual reality glasses tracking type and cognitive style. Thus, the third hypothesis was accepted.

To determine the direction of differences between groups and in favour of any of the groups, the "Scheffe test" was used for dimensional comparison. The following table shows the results.

**Table 5.** The Significance of the Differences in the Interactions between the Mean scores of the Four Groups in the English Vocabulary Skills Test

| **Scheffe** | **Positional** | **Rotational** |
|---|---|---|
| Impulsivity | 33.52 | 31.30 |
| Reflectivity | 34.18 | 32.48 |

The results presented in Table 5 indicate that the mean scores of Reflectivity cognitive style pupils, who studied through positional Virtual reality glasses tracking, occupy the first highest grade group. This was followed by the second highest group, the Impulsivity cognitive style pupils, who studied through positional Virtual reality glasses tracking. In the third highest group are the Reflectivity cognitive style pupils who studied through rotational Virtual reality glasses tracking, and then the fourth and last highest

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group is the Impulsivity cognitive style pupils who studied through rotational Virtual reality glasses tracking.

The following are the results of the statistical analysis of the effect of interaction between Virtual reality glasses tracking types and Cognitive style to develop immersion. Table 5 shows the mean scores of the different groups in the post-application of immersion scale in addition to the standard deviation for each group.

**Table 6.** Mean Scores and Standard Digression of Primary Pupils in Post Application of Immersion Scale (Maximum Grade = 58)

| Variable | | Virtual reality glasses tracking types | | Total |
|---|---|---|---|---|
| | | Positional | Rotational | |
| Cognitive style | Impulsivity | Mean= 51.74<br>St.dv.= 1.096<br>N= 23 | Mean= 50.35<br>St.dv.= 1.112<br>N= 23 | Mean= 51.04<br>St.dv.= 1.299<br>N= 46 |
| | Reflectivity | Mean= 52.14<br>St.dv.= 1.552<br>N= 22 | Mean= 51.05<br>St.dv.= 1.117<br>N= 21 | Mean= 51.60<br>St.dv.= 1.450<br>N= 43 |
| Total | | Mean= 51.93<br>St.dv.= 1.338<br>N= 45 | Mean= 50.68<br>St.dv.= 1.157<br>N= 44 | Mean= 51.31<br>St.dv.= 1.395<br>N= 89 |

It is evident from Table 6 that:

- The mean score of the positional group is higher than that of the rotational group on the Immersion Scale.
- The mean score of the Reflectivity group is higher than the mean score of the Impulsivity group on the Immersion Scale.

Table 6 contains the data necessary to know the significance of each of the following:

- The difference between the mean scores of primary school pupils in the group of positional Virtual reality glasses tracking and the mean scores of primary school pupils in the group of rotational Virtual reality glasses tracking.
- The difference between the mean scores of primary school pupils in the group of Impulsivity cognitive style and the group of Reflectivity cognitive style.
- The interaction between Virtual reality glasses tracking types (Positional - Rotational) and Cognitive style (Impulsivity-Reflectivity) to develop English vocabulary skills among primary stages pupils with learning difficulties.

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## Discussion

The results indicated the superiority of the groups studied through positional Virtual reality glasses tracking. The researcher further explained that positional Virtual reality glasses tracking help pupils to navigate freely. He was curious when he saw the presentation in virtual reality glasses and was so excited that he felt like he was part of the VR show. Also, he always looks forward to going back to watch again if he is interrupted. As a result, pupils find an actual width to learn more and Virtual reality glasses has helped him to express himself in English language on the things around. However, pupils preferred immersion using positional virtual reality glasses tracking. This result is in agreement with the results of the study of Bailenson et al. (2008) and Smith (2015). Regarding the cognitive style (Impulsivity-Reflectivity) variable and its impact on developing immersion, the research found the superiority of groups with reflective cognitive style rather than groups with cognitive impulsivity style. Also, this result can be attributed to the need for concentration for the pupils with learning difficulties and taking time in the learning processes and engaging and immersion in learning English vocabulary, thus, making fewer mistakes and continue in progress to achieving a high grades and intense competition with colleagues. This is unlike impulsive pupils who do not take longer time but quickly fall into many mistakes that hinder their learning process and make them to quickly drop out from the interactivity, especially in English vocabulary. In addition, reflective pupils had no difficulties watching the presentation with VR glasses due to their characteristics in thinking and mental style. This result is in agreement with the results of the study of Sternberg and Grigorenko (1997).

Regarding the interactivity between virtual reality glasses tracking type and cognitive style, the results of the study indicated that there was no interaction between virtual reality glasses tracking type (Positional - Rotational) and cognitive style (Impulsivity-Reflectivity). This is due to the lack of a direct relationship between cognitive style and virtual reality glasses tracking type, especially in immersion end engaging with learning and acquiring English vocabulary skills. In addition, there is no preferred pattern for virtual reality glasses tracking type with one of the cognitive methods that were dealt with in the research, especially in learning and acquiring English vocabulary skill.

## Recommendation

Following four groups of Quasi-experimental design, the obtained results indicated that there was no interaction between virtual reality glasses tracking type (Positional - Rotational) and cognitive style (Impulsivity-Reflectivity). This is due to the lack of a direct relationship between cognitive style and virtual reality glasses tracking type, especially in immersion with

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learning and acquiring English vocabulary skills. Also, there is no preferred pattern for virtual reality glasses tracking type with one of the cognitive methods that were dealt with in the research, especially in learning and acquiring English vocabulary skills.

Considering the results, the research recommends the following:

1. Pay attention to employing technologies, especially virtual reality glasses, for pupils with learning difficulties.
2. Provide teachers training on virtual reality glasses tracking apps in their classrooms.
3. Encourage teachers to use a variety of technology, including virtual reality glasses tracking, to improve their teaching abilities and skills.

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