

Virtual reality (VR) was coined in 1989 by Jaron Lanier, the chief executive officer of VPL Research, Inc., a manufacturer of gloves, goggles and other VR products and then VR become a medium of the popular press such as the telephone, television and movies . However, television and movies were passive not interactive, although they conveyed real or imagined experiences. Moreover, video games were also popular in 1990s. However, they were not considered as realistic despite that fact that they are interactive. On the other hand, as Satava in 1993 pointed out, VR convey the visual information in an interactive and realistic way because a person can move about and interact in the virtual world. Additionally, much of the research and development being implemented in the game and simulation industry match with the efforts of the VR industry.

The virtual reality was used to be defined as a fully three-dimensional computer-generated world in 1990s . Today, the VR is more or less defined as the 3D representations of objects, persons or events in past, present or future because all VR glasses aim to visualize information in an effective way. Nowadays, VR glasses is used to enjoy not only 2D, 3D and 360-degree content (i.e. image or video) but also to view webpages.

In 1990s, the definitions of VR were highly associated with a collection of technological hardware because VR systems was used to consist of computers, head-mounted displays, headphones and motion-sensing gloves because the ability to visualize information was used to consider as an important property of computer systems. Today, more focus seems to be on software because the world was surrounded by hundreds of VR glasses such as Samsung, HTC, Oculus and so on. On the other hand, the number of VR glasses is still in increase with new specifications. For instance, a head-mounted display with the support of a data-glove and stereophonic speakers was used to totally immerse the senses of people in the virtual world . Nowadays, devices such controllers, game controllers and headsets are also connected to the VR glasses for providing a more immersive experience.

Whenever something seems to have an impact on the safety of people or to become more expensive or to be distant in time or place, simulations are considered as a solution instead of having physically experiences. The purpose of this study is to develop a model for grading the properties and attributes of virtual reality glasses. The research questions of the study have been formulated as:

- First, what properties and attributes should be assessed for grading a virtual reality glass?
- Secondly, how many points should be assigned for each property and attribute for grading?
- Thirdly, what are the criteria of people when they decide to purchase a VR glass?

This study is important since it helps people understand the specifications of the VR glasses around the world because they will match their criteria with the specifications of the VR glasses.

An instrument should be developed to indicate what properties and attributes of VR glasses should be assessed and graded. Several virtual reality glasses (or head-mounted displays) were compared in the study of Akaslan and Fred (2008) to design and implement a virtual reality glass in terms of four criteria namely accountability, portability, interaction and accessibility. At the beginning of their study, they examined the properties and attributes of several VR glasses and gave a point for each property and attribute. The instrument used to assess and grade the properties and attributes of VR glasses available will be based on the model developed by Akaslan and Ernst in 2018. They evaluated both mobile and desktop-based VR glasses in their study. However, only mobile-based VR glasses will be assessed and graded in this study.

Hundreds of VR glasses exist in the world from few to thousand dollars. However, it is not possible to assess and grade the properties and attributes of all the VR glasses available on the Internet. The properties and attributes of VR glasses as given in Table 1 will assessed and graded in this study. The study of Akaslan and Fred (2018) focused on several properties and attributes of VR glasses namely lenses, headband, compatibility, size, view of field, accessories, ventilation, focus setting, weight, volume, lenses setting and price. The properties and attributes utilized in the study of Akaslan and Fred (2018) are re-evaluated and extended in this study.

It is hoped and expected that this study will enable people to understand the properties of virtual reality glasses in the market. Moreover, the findings of this study may be also a guidance for people in searching, matching and purchasing a virtual reality glass with what they are looking for.

Keywords: virtual reality, glasses, head-mounted displays, model, assessment