Get Chems:Augmented Reality for Chemistry as Inovation of Chemistry Media Learning to Help Deaf Student in Hydrocarbon Topic

Ella Septiana Adi Gunaning[1,*], DyahUlfah Masfufah[2]

[1]Biology Department, Semarang State University
Gedung Perkuliah Fakultas MIPA
Jalan Sekaran, Gunung Pati, Sekaran, Gn. Pati, Kota Semarang, Jawa Tengah, *email: ellasepgunaning@gmail.com
[2]Chemistry Department, Faculty of Mathematic and Natural Science, Semarang State University

One of the chemical learning materials in high school is hydrocarbons, according to students, this material is difficult because it has a high level of abstraction concerning the form and the invisible nature, the names of the compounds are very strange in the ears of students. Especially for students who have physical deformities in the form of deaf, which has barriers in processing the language information beyond his hearing, whereas this hydrocarbon material includes compulsory materials for high school students. To overcome this problem, a learning medium is needed to help students understand more hydrocarbon material on visible substances, and can be used by deaf students. GetChems: Augmented Reality for Chemistry as one of the ideas of inovation interactive media for hydrocarbon material. This media uses augmented reality technology that combines the visual world and the real world. The media is a book equipped with learning materials and markers that will feature molecules and chemical chains when smart phone cameras are directed at markers. So, this is the idea of Chemistry media learning to help Deaf student in hydrocarbon topic.

Keywords: Hydrocarbon, Augmented Reality, Deaf

Introduction

Chemistry containing of abstract concepts, like as atom, molecul, and electron. Therefore, during learn chemistry not just memorize, but should have good understanding (Haris & Wahidah Al-Idrus, 2008). One of the chemical learning topic in high school is hydrocarbons, this topic need to understanding basic concept, because student should learn about chemical bounding, givename of chemical bound, and compound characteristic (Perdana, Utomo, & Yamtinah, 2014). According to students, this material is difficult because it has a high level of abstraction concerning the form and the invisible nature, the names of the compounds are very strange in the ears of students, especially for students who have hearing disability.

Hearing disability or medically call deaf, is condition when the hearing mechanism does not work properly, because some reason like as the damage or anomaly of hearing organ. Hence, there is barrier for hearing disability to processing linguistic information through audition. From pedagogic side, kids that include to hearing disability category is who could not join the educational program for normal student, so they are need special service of education (Abdullah, 2013). To solve this problem, a learning media is needed to help students understand hydrocarbon topic on visible substances.

Nowdays, smartphone have using almost by all people, including the student. Lot of smartphone have processing capabilities that possible for using augmented reality(AR) technology. Augmented reality technology combined virtual object and world reality, the virtual object could present information that hard to accept by human sense(Nugroho & Pramono, 2017). The advance of that mobile andAR technology could be implemented for improving learning activities(Figueiredo, Gomes, Gomes, & Lopes, 2014), moreover for deaf student.

Augmented reality can be categorized into marker-based and markless-based. Marker based application have three component; marker information that offering in the booklet, a gripper for getting information from booklet and converting it to another type of data, a cube for augmenting the information into 3D information which showed on the screen. Whereas, markless-based use tracking sytem, that is global positioning system, compas, and image regocnition device screen (Johnson, 2010). For class using, we could just using marker-based category, so the student concentration more focus to the book and teacher.

GetChems: Augmented Reality for Chemistry, as one innovationideas of interactive media learning for hydrocarbon material. This media will use augmented reality technology, that combines the visual world and the real world. The component for supporting media is a book equipped with learning materials and could offering markers, that will feature molecules shape and chemical chains when smart phone camera's are directed at markers.

Material and Method

The problem of learning chemistry for dief student need to solve. The idea for solving the problem is an augmented reality application named GetChems, which contain hydrocarbon topic. For supporting the idea, firstly to do is collecting literature from internet, that is online article.Form literature we could know how far the developing of augmented reality technology that implemented in the learning activities, especially for deaf student.

Literature also give information how to stake out the idea, so it would be easier for other people which want to develop and implement in the class. The plan of developing the idea is observe what userneed for learning media in the class, stake out the system of AR marker-based application, implementation, testing, and using the application also care of hardware and software(Nugroho & Pramono, 2017).

Result and Discussion

GetChems is an idea of chemistry media learning, especially hydrocarbon topic. The reason why we are sure about the idea is AR has been experimentally applied in the school during the last two decades, although not as much as classics methods of learning (Lee, 2012). There are three component of this application: marker information that offering in the booklet, a gripper for getting information from booklet and converting it to another type of data, a cube for augmenting the information into 3D information which showed on the screen (Johnson, 2010).

For developing the idea, we have stake out the plan. Based on literature, the plan to developing AR application is observe what user need for learning media in the class, stake out the system of AR marker-based application, implementation, testing, and using the application also care of hardware and software(Nugroho & Pramono, 2017).

In the implementation step, the developer have to attention the features that are must in an AR application. The features are:

1. Images: application having ability to show three-dimensional images that appear to user in life sized.

2. Object recognition: this allow you to look around by scan anything that comes under your sight, AR marker-based application need marker for this feature.
3. Change in perception: AR combined worl-life object and virtual object, so to achive desired results, should be there a seamless join between the user head, eye, and hand movements depending on the device.
4. Zero latency: should be no delay between the user action and system's response for aim natural free-flowing experience(Agrawal, Kulkarni, Joshi, & Tiku, 2015).

We need booklet that could offering marker, for supporting the process of combining virtual and word-life object ability. Here is example of booklet design:

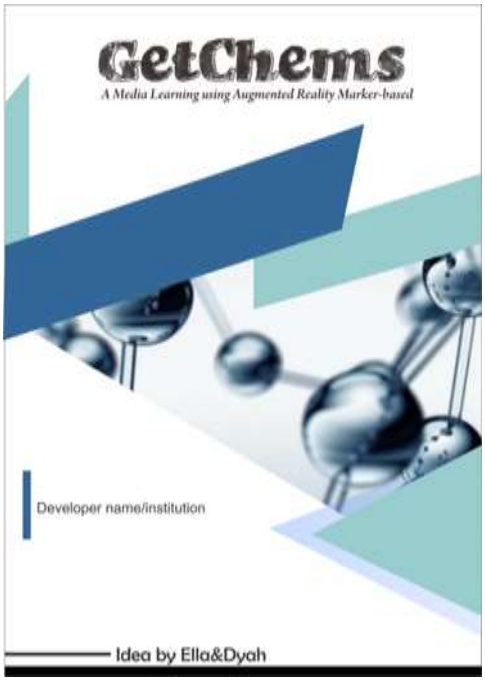

Fig. 1. Cover book design

Fig. 2. Design of one page in booklet

The software and hardware are needed for making augmented reality application. Hardware and software that needed are based on system analysis. The aim of system analysis is to understand problem that will be facing during the developing of AR application(Nugroho & Pramono, 2017). Here are the hardware will use:

Processor Intel Core i5, VGA NVIDIA Gefore 610M 2GB, and memory capacity 8 GB. Then, the software will use: Game Engine Unity IDE 5.2.2 Version, vuforia-unity-6-0-17.unitypackage, and Microsoft windows 8.1 (Nugroho & Pramono, 2017).

AR marker-based application that using booklet to accomodate media learning has to be performed at a minimum rate of 25 fps, because the system should respond quickly to the activity of the user, such as a page movement or a page turn. For recognize a 3D marker in a world-life object, there is a conventional system, that is using a Cartesian coordinate 3D marker.There are various devices which AR can be used, as smartphone, tablets, PC, connected TV, and connected glasses(Lim & Lee, 2013). Nowdays,wireless mobile devices, such as smart phones and tablet PCs, are increasingly ushering in this AR technology(Lee, 2012), that could be beneficial in learning activities, moreover for deaf students.

After implentation step, next step is testing.

Table 1. Testing instrument table(Nugroho & Pramono, 2017)

No.	Testing	Process	Result
1	Install the application	The process of installation running well	...
2	Running the application	Running properly without any problem	...
3	Marker detection	Object could appear	...

That all instructional plan to implementation GetChems application using marker-based AR technology.

Conclusion

GetChems is an idea of chemistry media learning, especially hydrocarbon topic. This idea would answer the proble of difficulties learn chemistry for deaf student, because there is barrier for hearing disability to processing linguistic information through audition. Instructional plan to develop the application is observe what user need for learning media in the class, stake out the system of AR marker-based application, implementation, testing.

References

Agrawal, M., Kulkarni, A., Joshi, S., & Tiku, N. (2015). Augmented reality. *International Journal of Advance Research in Computer Science and Management Studies*, *3*(2), 114–122.

Figueiredo, M., Gomes, J., Gomes, C., & Lopes, J. (2014). Augmented Reality tools for teaching and learning. *EduRe Journal*, *1*(1), 22–34.

Haris, M., & Wahidah Al-Idrus, S. (2008). Analisis kesulitan belajar kimia ditinjau dari kesalahan konsep siswa kelas x SMA Negeri 3 Mataram. *Jurnal Pijar MIPA*, *VI*(2), 77–80.

Johnson ,L.,Levine,A.,Smith,R.,&Stone,s.(2010).Simple Augmented Reality .The 2010 Horizon Report ,21-24.Austin,TX:The New Media Constium

Lee, K. (2012). The Future of Learning and Training in Augmented Reality. *InSight: A Journal of Scholarly Teaching*, *7*, 31–42.

Lim, S., & Lee, J. (2013). An Immersive Augmented-Reality-Based e-Learning System Based on Dynamic Threshold Marker Method. *ETRI Journal*, *35*(6), 1048–1057.

Nugroho, A., & Pramono, B. A. (2017). Aplikasi mobile Augmented Reality berbasis Vuforia dan Unity pada pengenalan objek 3D dengan studi kasus gedung m Universitas Semarang. *Jurnal Transformatika*, *14*(2), 93–98.

Perdana, D. D., Utomo, S. B., & Yamtinah, S. (2014). Upaya peningkatan minat dan prestasi belajar materi hidrokarbon melalui penerapan model pembelajaran kooperatif tipe student team achievement division (stad) berbantuan kartu soal pada siswa kelas x semester genap SMA N 8 Surakarta tahun pelajaran 2012. *Jurnal Pendidikan Kimia UNS*, *3*(1), 74–79.