

# Needs Analysis of Physics Learning Media Development Based on Augmented Reality Technology for High School Students

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## Abstract

This study aims to examine what educators and learners require in order to create augmented reality-based educational materials for high school students. Descriptive research is one of the study methods used in research and development (RND). The data collection used is by conducting literature studies, observations, interviews and filling out questionnaires. This research instrument consists of observation sheets, interview sheets, and questionnaire sheets. Both quantitative and qualitative data analysis were the methods employed for the data analysis. The findings of the analysis of student needs questionnaires showed that, on average, 69% of the category agreed to the development of augmented reality-based learning media. These findings are based on observations made during teacher interviews, which indicate that the learning media used are still conventional and cause students to struggle with understanding learning materials. Thus, it follows that the utilization of learning materials based on augmented reality is required as a supporting medium in the educational process.

## A. Introduction

The emergence of the fourth industrial revolution has led to the utilization of intelligent engineering and the internet of things as conduits for human and machine mobility and communication. The Indonesian government is implementing several reforms in the areas of information technology, communication, and other areas in preparation for the very challenging Industrial Revolution 4.0. In the period of the fourth industrial revolution, education is crucial in educating future generations to meet the difficulties of progress (Sabaruddin, 2022). This century will bring about an educational revolution known as education 4.0, which calls for significant modifications to the way that people learn. The learning process in schools is highly required to engage this generation with digital media. Growing up with few siblings makes them like little kings and queens for their parents, thus giving the effect of becoming selfish individuals, difficult to compromise and work together in teams. The main thing in the learning process for this generation is how we can reduce their selfishness while building collaborative nature (Lukum, 2019).

It is impossible to discuss education quality without mentioning the classroom learning experience. Teachers and students are two crucial components of classroom learning. The role of teachers is to instruct, and pupils absorb knowledge. Teaching is the act of imparting knowledge to an individual or group of individuals with the hope that they would comprehend or know what the teacher is teaching them (Magdalena et al., 2021). As one of the primary foundations for the advancement of the country's future generation, the education sector must change with the times to ensure that it does not fall behind industrialized nations in terms of curriculum and educational technologies (Dito & Pujiastuti, 2021).

The findings of observations conducted at SMAN 7 Bengkulu City revealed that students find it challenging to comprehend course topics due to the underutilization of technology in the classroom. I also learned that the teaching resources still mostly consist of package books and LKS, with teachers using ppt and printed LKPD as their learning medium. Learning media are tools that may support the teaching and learning process in order to achieve the educational or learning objectives effectively and efficiently and to assist make the meaning of the information transmitted clearer (Rahmawati et al., 2017). According to Anwar, F., Pajarianto, H., Herlina, E., Raharjo, T. D., Fajriyah, L., Astuti, I. A. D., ... & Suseni (2022) learning media is a tool or material used with the intention that educational communication interactions between teachers and students can take place interactively in accordance with the planned objectives. The position of media in learning is very important and even parallel to learning methods, because learning methods usually demand what media can be integrated and adapted to the conditions at hand (Nurfadhillah et al., 2021). Learning media help to improve learning by facilitating communication between instructors and students, which makes learning activities more successful and efficient (Wulandari et al., 2023).

One must view the existence of technology as an attempt to improve efficacy and productivity. Difficulties and technology go hand in hand since human difficulties were the driving force behind the creation of technology. This makes instructional technology a process as much as a product (Agustian & Salsabila, 2021). The use of media in learning aims to create an interactive learning atmosphere between teachers, students and the learning environment. Media is an "inanimate object" and will become "alive" requiring teacher intervention, starting from planning, selection and accuracy in operating the media so that it can contribute to learning (Budiyono, 2020). The authorities need to address the inequitable infrastructure that facilitates the use of ICT in education right now, since without it, this use of technology in the classroom would remain a pipe dream. Solving actions that are also necessary for the effective use of ICT in learning are necessary to get over these barriers (Sujono, 2020).

Augmented reality is one of the technologies that may be utilized as educational content. Technology known as augmented reality, or AR, offers fresh concepts as a tool to support learning. Through the integration of the Augmented Reality (AR) idea, which presents a visual picture on the user's smartphone. According to Nursakti (2022), Technology known as augmented reality (AR) blends real-time digital material produced by computers with the physical environment. Teachers may offer learning materials more effectively by incorporating Augmented Reality (AR) in instructional media (Adli et al., 2022). In Augmented Reality Technology (AR) there are 2 methods that are often used, namely: 1) Marker Based Tracking method, where in this method Augmented Reality (AR) Technology uses markers or object markers that have a pattern that will be read through webcam media or cameras connected to a computer, usually this marker is a black and white square illustration with thick black borders and a white background (Aldriyan & Amini, 2020). 2) Markerless Augmented Reality method is a method that does not require special markers or markers for operation (Indriyani & Suryanto, 2021).

In the 2013 curriculum, the best learning media to use is IT-based learning media (Science Technology) as a learning resource. The learning media used by teaching staff in the 2013 curriculum currently does not fully use IT-based learning media. This was obtained from the results of interviews with teachers at SMAN 7 Bengkulu City. Due to the lack of use of technology as a learning medium in the learning process, learning is less interesting, so it is necessary to develop IT-based learning media in high schools. Along with technological developments, learning media must continue to innovate to create a good learning process.

Based on the results of observations at SMAN 7 Bengkulu City, it was found that the school had good wifi and internet facilities, and used the 2013 curriculum. The school also had laboratory facilities, a library and the learning media used were only PPT, printed LKPD and textbooks only. so that the learning media used is not optimal and is not in accordance with what is expected in the 2013 curriculum that has been implemented.

## **B. Research Methods**

This research is a qualitative descriptive research. The descriptive method is a method of researching a group of people, an object, condition, system of thought or events in the present. The sample in this study was class XI students of SMA N 7 Bengkulu City. And the research objects are teachers and students majoring in MIPA at the school. The research was carried out at the beginning of the odd semester of the 2023/2024 academic year at SMAN 7, Bengkulu city. The research was conducted from July to August 2023.

The procedure for carrying out this research starts from determining the research subjects, namely students majoring in Mathematics and Natural Sciences and Physics teachers. Then the researcher compiled instruments in the form of observation sheets, teacher interview sheets and student needs questionnaire sheets. Researchers conducted interviews directly with teachers and distributed needs questionnaires directly to students. The next step is to analyze the percentage calculation of how much students and teachers need augmented reality-based physics learning media.

The data collection techniques used in this research were observation, interviews and questionnaires. Analysis of the student needs questionnaire uses a Likert scale as in Table 1

**Table 1.** Needs Analysis Likert Scale

Criteria	Score
Strongly Agree	4
Agree	3
Don't Agree	2
Strongly Disagree	1

After that it is analyzed using the equation (1)

$$\% \text{ interpretasi skor} = \frac{\sum \text{ skor perolehan}}{\sum \text{ skor maksimum}} \times 100 \% \dots\dots\dots 1)$$

Then it is entered into the score interpretation as in Table 2

**Table 2.** Likert Scale Interpretation of Scores

Percentage %	Category
0% - 25 %	Strongly Agree
26 % - 50 %	Agree
51 % - 75 %	Don't Agree
76 % - 100 %	Strongly Disagree

The research instruments used consisted of observation sheets, teacher interview sheets and student needs questionnaire sheets.

### C. Result and Discussion

The results of observations at SMAN 7 Bengkulu City, it was found that the school had good wifi and internet facilities, and used the 2013 curriculum. The school also had laboratory facilities, a library and the learning media used were only PPT, printed LKPD and textbooks only. so that the learning media used is not optimal and is not in accordance with what is expected in the 2013 curriculum that has been implemented.

Results of the needs questionnaire analysis of the student needs questionnaire filled in by 99 students of class XI SMA N 7 Bengkulu City consisting of 36 students from class XI MIPA 3, 34 students from class can be seen in Table 3.

**Table 3.** Student Needs Questionnaire Results

Aspect	Average	Category
Student responses to physics learning	66%	Agree
The need for augmented reality-based learning media	71%	Agree
Overall Average	69%	Agree

The results of the needs questionnaire analysis in table 3 regarding aspects of student responses regarding learning physics show that an average of 66% of students think that learning physics is a subject that is difficult to understand. Analysis of aspects of student needs in augmented reality-based learning media shows that an average of 71% of students in the category strongly agree with the development of this learning media.

This research is supported by previous research by Affriyenni et al. (2020) entitled "Development of Physics Learning Media on Geometry Optical Material Based on Augmented Reality with Unity and Vuforia". The research results show that the Augmented Reality-based learning media created is suitable

for use. Based on expert validation with a percentage of 92% and is included in the valid (feasible) category. And based on a limited trial with subjects of 20 students of the FMIPA UM science education study program, the media created was assessed as effective and efficient by administering an efficiency indicator questionnaire and obtained an average indicator of 87% and was said to be suitable for supporting learning.

The implementation of this research can be used as an analysis of media development needs that can be continued at the development stage, especially to develop physics learning media based on augmented reality.

In this research, the research sample was Mathematics and Natural Sciences students at SMA Negeri 7 Bengkulu City. There are several limitations, namely the insufficient number of respondents which can be an obstacle to conveying the true situation. The research results also depend on the respondent's ability to understand the statements in the questionnaire. Apart from that, limited time, energy and abilities of researchers can also affect the quality of research. Therefore, in order for research results to be more accurate, research needs to be developed with a larger number of respondents and better respondent abilities.

#### D. Conclusion

The use of augmented reality-based learning media is very much needed as supporting media in the learning process.

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#### References

- Adli, M., Sulistiyono, M., Sudibyo, T., & Bernadhed, B. (2022). Analisis Dan Pengembangan Media Pembelajaran Tentang Pengenalan Benda Disekitar Sekolah Berbasis Augmented Reality Menggunakan Unity Di Paud Labiba Maulida Boyolali. *Respati*, 17(2), 30. <https://doi.org/10.35842/jtir.v17i2.455>
- Affriyenni, Y., Swalaganata, G., Mustikasari, V. R., & Fitriyah, I. J. (2020). Pengembangan Media Pembelajaran Fisika pada Materi Optik Geometri Berbasis Augmented Reality dengan Unity dan Vuforia. *JIPVA (Jurnal Pendidikan IPA Veteran)*, 4(2), 160–174. [Google Scholar](#)
- Agustian, N., & Salsabila, U. H. (2021). Peran Teknologi Pendidikan dalam Pembelajaran. *Islamika*, 3(1), 123–133. <https://doi.org/10.36088/islamika.v3i1.1047>
- Aldriyan, A. A., & Amini, S. (2020). Penerapan Metode Marker Based Tracking Untuk Pembelajaran Anak Berkebutuhan Khusus. *Skanika*, 3(4), 1–6. [Google Scholar](#)
- Anwar, F., Pajarianto, H., Herlina, E., Raharjo, T. D., Fajriyah, L., Astuti, I. A. D., ... & Suseni, K. A. (2022). *Pengembangan Media Pembelajaran "Telaah Perspektif Pada Era Society 5.0"* Penulis. [Google Scholar](#)
- Budiyono, B. (2020). Inovasi Pemanfaatan Teknologi Sebagai Media Pembelajaran di Era Revolusi 4.0. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, 6(2), 300. [Google Scholar](#)
- Dito, S. B., & Pujiastuti, H. (2021). Dampak Revolusi Industri 4.0 Pada Sektor Pendidikan: Kajian Literatur Mengenai Digital Learning Pada Pendidikan Dasar dan Menengah. *Jurnal Sains Dan Edukasi Sains*, 4(2), 59–65. <https://doi.org/10.24246/juses.v4i2p59-65>
- Indriyani, T. W., & Suryanto, A. (2021). Markerless Augmented Reality (AR) pada Media Pembelajaran Pengenalan Komponen Transmisi Manual Mobil. *Edu Komputika Journal*, 8(1), 57–67. <https://doi.org/10.15294/edukomputika.v8i1.44484>
- Lukum, A. (2019). Pendidikan 4.0 Di Era Ggenerasi Z: Tantangan Dan Solusinya. *Pros.Semnass KPK*, 2, 13. [Google Scholar](#)
- Magdalena, I., Fatakhatas Shodikoh, A., Pebrianti, A. R., Jannah, A. W., Susilawati, I., & Tangerang, U. M. (2021). Pentingnya Media Pembelajaran untuk Meningkatkan Minat Belajar Siswa SDN Meruya Selatan 06 Pagi. *EDISI : Jurnal Edukasi Dan Sains*, 3(2), 312–325. [Google Scholar](#)

- Nurfadhillah, S., Ramadhanty Wahidah, A., Rahmah, G., Ramdhan, F., Claudia Maharani, S., & Muhammadiyah Tangerang, U. (2021). Penggunaan Media Dalam Pembelajaran Matematika Dan Manfaatnya Di Sekolah Dasar Swasta Plus Ar-Rahmaniyah. *EDISI : Jurnal Edukasi Dan Sains*, 3(2), 289–298. [Google Scholar](#)
- Nursakti, Anaguna, N. (2022). Pelatihan Pembuatan Media Pembelajaran Interaktif Berbasis Augmented Reality. *Jurnal Pengabdian Masyarakat UNIPOL (Abdimas Unipol)*, 1(1), 24–27. [Google Scholar](#)
- Rahmawati, D., Wahyuni, S., & Yushardi. (2017). Pengembangan Media Pembelajaran Flipbook Pada Materi Gerak Benda Di SMP. *Jurnal Pembelajaran Fisika*, 6(4), 326–332. [Google Scholar](#)
- Sabaruddin, S. (2022). Pendidikan Indonesia Menghadapi Era 4.0. *Jurnal Pembangunan Pendidikan: Fondasi Dan Aplikasi*, 10(1), 43–49. <https://doi.org/10.21831/jppfa.v10i1.29347>
- Sujono. (2020). Penerapan Media Pembelajaran Berbasis Teknologi Informasi dan Komunikasi (TIK) Dalam Upaya Meningkatkan Motivasi Belajar Siswa. *Ta'dib*, 18(1), 101–102. [Google Scholar](#)
- Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, 5(2), 3928–3936. <https://doi.org/10.31004/joe.v5i2.1074>

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