Interactive basic mathematics web using Wordpress

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Abstract. Wordpress is a popular open source tool that can be used for developing learning media. Basic Mathematics is the difficult subject for a physics student. The students need an interactive learning to improve their knowledge. The aims of this study were to develop the interactive media using Wordpress and to know the effectiveness of web as a learning media to improve the ICT Literacy students. This study used ADDIE models. The effectiveness of interactive web can be described as the students’ equipness of ICT literacy. The population is physics students. The findings show that the interactive web is valid for the content, presentation, linguistic, and graphic aspects. The results concluded that basic mathematics interactive web is effective to equip the learners ICT literacy of categories of high, medium, and low with the observations and questionnaires are in very good criteria.

1. Introduction
Basic Mathematics is the difficult subject for a physics student. The results of interviews with students who had been taken basic mathematics regarding the difficulties in understanding the material [1-3]. Students often only find numbers, formulas, charts, and die pictures, thus all things make the students feel less interested and think the materials are boring. Lack of teaching materials specifically for this subject is the reasons faced by the students [4]. This condition makes the activity and results of student learning to be low. Students commonly use the textbook as an aid in studying for exams, they do not read all of the books but only partially read according to their needs [5]. Therefore, the attractiveness of the students can increase by the media so that it can improve students’ motivation and understanding can improve. The use of media in the learning process can clarify the message that is not too verbal, overcoming the limitations of space and time, and excite student’s learning [6]. The students need an interactive learning to improve their knowledge. The aims of this study were to develop the interactive media using Wordpress and to know the effectiveness of web as a learning media to improve the ICT Literacy students. ICT (Information and Communications Technology) stands in interesting relation to literacy, being as it is capable both of supporting and promoting the basic skills of reading and writing - the dominant classroom definition of literacy [7]. The idea for becoming successful in XXI century required ICT literacy skills [8]. ICT literacy is defined as the ability to effectively evaluate, navigation, and build the information by using various digital technologies. ICT literacy becomes an important precondition for the socialization and professional career [9]. Therefore, ICT literacy plays an important role in social development in education. ICT literacy differentiates among three major dimensions: knowledge of technology, skills relevant to using the technology, and attitudes of using technology [10].
Based on preliminary studies with the students, it is known that there are no web-based media yet to learn basic mathematics subject. The development of Internet-based information technology can make it easier for students to better understand the learning materials well. With advances in technology such as increased bandwidth, wider internet coverage and increasing number of standalone and web-based education-related software, teachers are expected to be able to use the technology available in schools to improve teaching and engage students in learning. Based on above conclusion, we need to innovate interactive media so that it can help the students to understand the concept, one of them using Wordpress. Wordpress is an online, open source website creation tool written in PHP [11].

But in non-geek speak, it’s probably the easiest and most powerful blogging and website content management system (or CMS) in existence today [11]. Wordpress has thousands of plugin pieces of software and it’s customizable so you can use your site for just about anything. With appropriate choice of media or learning resources, it can affect the ability of students to engage in learning through interaction with the media [12], [13].

The web that is going to be developed is the web which can involve the students in its use Orin other words, the interactive web. The interactive web can help students to achieve a better understanding of the topic because they can interact with the teacher. The interactive web can also facilitate long-distance learning because it encourages interaction between teacher-student, within students and student-content. The interactive web makes learning remains student-centered, so they can understand the content well. Accordingly, we need to develop interactive web for basic mathematics subject.

2. Method
The development procedures in this study use a model ADDIE (Analyze, Design, Develop, Implement and Evaluation). The steps of design ADDIE model of the analysis are analyze, design, develop, implement, and evaluate [14]. The study was conducted in Physics Education Study Program. Analyze stage was carried out by analysis syllabus, interviews with an associate friend, determine the students’ need for students’ need questionnaire, and analysis textbook. Design stage was carried out by design the interactive media. After having a self-evaluation completely, validation activities carried out in the form of validation fill out a web-based learning media by the validated-lectures to obtain a valid web. Validation of web-based learning media was carried out by four lecturers. On sheet validation, they also took a note on some of the links found on the web.

The effectiveness of interactive web can be described with the students’ equipness of ICT literacy. The indicator of ICT Literacy with using web can be seen in Table 1.
### Table 1. The indicator of ICT literacy with using web

| Variable                      | Dimension                               | Indicator                                                                 |
|-------------------------------|-----------------------------------------|---------------------------------------------------------------------------|
| ICT Literacy                  | Knowledge of web                        | a. Have knowledge of web                                                 |
|                               |                                         | b. Be able to identify content management system (or CMS) that able to create web. |
|                               |                                         | c. Be able to provide an actual assessment of using web                   |
|                               |                                         | d. Know the basic feature of web                                         |
|                               |                                         | e. Able to distinguish the virtual world and the real world.              |
|                               | Relevant skills to using the web        | a. Able to use web features                                              |
|                               |                                         | b. Able to search and access web                                         |
|                               |                                         | c. Able to take advantage of basic services on the internet, such as creating accounts, using e-mail, attaching and downloading data, participating in discussion forums and social networking sites |
|                               |                                         | d. Able to use computer & internet to support critical thinking, creativity, and innovation in work. |
|                               | attitudes of using technology           | a. Have the ability to use web for individual or group.                   |
|                               |                                         | b. Utilize web responsibly/wisely.                                       |
|                               |                                         | c. Understand the consequences of using technology. For example, the habits of communicating with the lecturer, able to understand the effect of using technology. |

All of the population in this study are physics students. The data collection is done by the observation and questionnaires of the students’ equipness in ICT literacy with effective criteria only if it is in good or excellent criteria.

### 3. Result and discussion

Validation of web-based learning media was carried out by four lecturers. On sheet validation, they also took a note on some of the links found on the web. On sheet validation, they also took a note on some of the links found on the web.

Untuk website nya, sudah sangat bagus sekali. Pewarnaan, grafik, dan animasinya sudah lebih dari cukup. Saran dari saya adalah link yang diberikan sebaiknya langsung ke web aslinya, tidak usah pakai localhost lagi, sehingga tidak terjadi k egalalan akses pada beberapa menu penting, seperti:

1. http://localhost/matdastes/pages/team/
2. http://localhost/matdastes/about/
3. http://localhost/matdastes/evaluasi/
4. http://localhost/matdastes/materi/

**Figure 1.** Advice from a validated-lecturer on a link on the web
The next suggestion is the evaluation tests.

Saya sudah mencoba tes evaluasinya. Saran dari saya, diantaranya sebagai berikut:
1. Evaluasi 1, Soal No. 8, gak ada jawabannya atau salah kunci jawaban. Secara keseluruhan, soalnya terlalu mudah (saya bisa ngerjain dengan mencegak). Kunci jawabannya gak ada pengecoh. tuliskan tanda "+=" disetiap akhir soal.
2. Evaluasi 2, Soal No. 4 dan 5, gak ada jawabannya atau salah kunci jawaban. Soal No. 8, sebaiknya kata "atau" atau tanda ",," nya dihapus, pakai salah satu saja. Soal No. 9 merupakan pertidaksamaan bukan persamaan. Selain itu, jawabannya gak ada karena harus dalam bentuk interval. Secara keseluruhan, soalnya terlalu mudah (sebaiknya besar soal, saya bisa ngerjain dengan mencegak). Kunci jawabannya gak ada pengecoh. Coba dipahami pembuat nol dalam penyebut soal.
3. Evaluasi 3, gak bisa masuk. Apakah password nya salah atau emang belum bisa di akses.
4. Evaluasi 4, Soal No. 2 dan 4, gak ada jawabannya atau salah kunci jawaban.
5. Evaluasi 5, Soal No. 2, 4, dan 5, gak ada jawabannya atau salah kunci jawaban. sebaiknya besar soal membingungkan alias memiliki banyak arti (bias makna).
Soal yang bisa saya kerjakan menggunakan asumsi saya sendiri dalam

**Figure 2.** Advice from a validated-lecturer on the question of evaluation

The lecturers who validated it also provide advice to increase the loading time when accessing the web. It is intended that the learning process becomes efficient without losing a lot of time in accessing each page of the web. Based on the advice of them, the researchers conducted a revision to make small the size of each of the constituent components in order to improve the speed of loading web. After doing the revision, the speed of the web was tested by using the service GTmetrix (www.gtmetrix.com). Here is a picture of the web speed test results GTmetrix.

![GTmetrix](image)

**Figure 3.** Screenshot Loading Speed

In Figure 3, it shows that the web speed test results of grade 87%, load time is 7:19 seconds and the total size of pages is 380 KB. Results Validation by the lecturers for all aspects can be seen Table 2.
Table 2. Results Validation All Aspects

| ASPECTS     | TOTAL | SCORE |
|-------------|-------|-------|
| Material/content | 86    | 89.58%|
| Presentation  | 94    | 87.04%|
| Linguistics   | 67    | 79.76%|
| Graphic       | 115   | 87.12%|
| Total         | 362   | 86.19%|

The results of validation by the four lectures, it indicated that the validity of web-based learning media included in the criteria developed is very valid. The results of validation from the lectures as a whole is 86.19%.

The view of interactive basic Mathematics web can be seen in Figure 4.

Figure 4. The Interactive Basic Mathematics Web
The equipness of ICT literacy using observation sheet and questionnaire ICT literacy. Validity test shows there are 52 valid statements of 55 statements with the level of reliability is very high (0.942). The respondents’ knowledge of web is in the pretty good category (value 86%). The respondents’ technical skills relevant to using the web are in low category (value 49%). The last, the respondents’ attitudes accruing from the critical reflection of using web skills are in pretty good category (value 80%).

4. Conclusion
Related to the findings and analysis of data, it can be concluded that web-based learning media for an introduction to mathematics subject in physics education department included in the criteria very valid. The results and discussion of this study concluded that basic mathematics interactive web is effective to equip the learners ICT literacy of categories of high, medium, and low with the observations and questionnaires are in very good criteria. Learning integrated with the basic mathematics interactive web can be applied as early as possible to equip ICT literacy because it is one of the XXI century competencies that must be owned by the current learner.

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