Research Article

Effectiveness of Learning Management System (LMS) on In-Network Learning System (SPADA) Based on Scientific

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Abstract

This research aims to describe the effectiveness and benefits of the Learning Management System (LMS) on the In-network Learning System (SPADA) based on scientific. This is a quantitative-typed research with the one-group pretest-posttest design. Using the purposive sampling technique, the sample was taken from the participants of the madrasa Teacher Profession Education (PPG) within the position at the IAIN (State Islamic Institute) Salatiga, Indonesia, in 2019. The results of the research showed that: (1) the assessment of the participants of PPG in the position of Madrasa teacher, which was as much as 30 people, said that the LMS on the SPADA was easy to conduct, practical, and effective; (2) the scientific-based LMS was in the menu of formative (observing) test, discussion (questioning, discussing, reasoning) forum, and final assignment (attempting); (3) test of Wilcoxon, $Z = -4.75$ with the significance $(p) = 0.000 < 0.05$, in summary that the scientific-based LMS on the SPADA was effective on the results of the pedagogical material summative learning of the participants of Madrasa PPG at the IAIN Salatiga, Indonesia.

Keywords:
learning management system, SPADA, scientific

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Introduction

The learning in the era of industry 4.0 revolution is done by the In-network Learning System (SPADA). Many people recognize SPADA as e-Learning. According to Horton (2006), e-Learning is a kind of learning-teaching which allows the delivery of teaching materials to students, using the media of internet, intranet, or other medias of computer network. Darmayanti (2007) states that e-Learning is a popular tool as an interactive tool for virtual education. E-Learning or SPADA is important to do due to current technology development and advancement, as well as the needs for students for the speed access, time optimization, and facilities simplicity and supporting facility. According to Suteja, *et al.* (2010), states that the ontology utilization in the e-Learning system development also participates in improving the learning quality and the verifying the effectiveness level on the retrieval of e-Learning system (the time needed to obtain information).

The learning of e-learning can be done based on scientific approach because it can improve the learning outcome. This is in line with Sulistiyono (2014) that the scientific approach can improve learning outcomes. The implementation and results of Sulistiyono's research are strengthened by the research of Mu'arif & Surjono (2016), which shows that the effectiveness of the Natural Science learning is better after using e-learning, as proven by the improvement of learning outcomes. According to Astutik & Prahani (2018) which states that the Collaborative Creativity Learning model that is integrated to the PhET simulation, can be used as a solution to enhance students' creativity in the Natural Science learning. The scientific approach in the 2013 curriculum learning includes: observing, questioning, attempting, associating, and communicating. Saputro (2017) argues that the scientific approach has the characteristic of prioritizing the dimensions of observing, questioning, attempting, reasoning, and communicating. The aspects and information on the scientific approach are as on Table 1.

Table 1.

The Aspects and Information on the Scientific Approach

No.	Aspect of Scientific Approach	Information
1	Observing	The activities in the aspect of observing are reading, hearing, listening, and seeing.
2	Questioning	The activity in the aspect of questioning is asking question about information which is not understood from what is observed, or question to obtain additional information about what is observed.
3	Attempting	The activities in the aspect of attempting or collecting information are observing events,

		and interviewing the sources.
4	Associating	The activity in the aspect of associating is processing information which has been collected, whether it is limited from the results of gathering/experimenting activities, or from the results of activities of observing and collecting information.
5	Communicating	The activity in the aspect of communicating is delivering results of the observation, questioning, attempting, and associating.

The e-learning or SPADA currently on field is used to the learning of the Teacher Profession Education (PPG), either in the environment of the Ministry of Education and Culture, or in the environment of the Ministry of Religion, and it is centered at the Ministry of Research and Technology. The SPADA has been regulated by the organizer of PPG to be able to ease the internet-based learning, with time efficiency and based on scientific.

The SPADA learning management has been prepared by carrying out socialization and knowledge to conduct it for lecturers and the participants of PPG. According to Almarashdeh, Sahari, Zin, & Mutasem (2010), state that the Learning Management System remains one of the most closely related to the learning process of higher education institution. In line with Lopes, A.P. (2014), shows that the Learning Management System can also be used for the purpose of assessment in Higher Education. Whereas according to Coates & Baldwin (2005) that the Learning Management System (LMS) can change the character of learning experience on campus. The Learning Management System (LMS) and the Learning Management Content System (LCMS) have been prepared in software which makes it easy for lecturers and the participants of PPG. This is in accordance with the results of research conducted by Sudiana (2016) which shows that the online LMS is effective for learning even though it has different levels of the ease of use. According to Falloon (2014) in his research shows that the virtual class proves to be useful for developing social relation and sense of community, although this may not be very useful to support deeper learning. Kakasevski, *et al.* (2008), stated that the Module feature of the learning management system is effective on online learning. Whereas according to Setiawan (2013) states that there is an increase in the learning outcome of Information and Communication Technology which is significant due to the use of Moodle e-learning. The average increase is 24.62. Rufaidah, *et al.* (2018), states that the learning model which can be integrated to technology is the Blended Learning model. The SPADA Learning Management System is as on Figure 1.
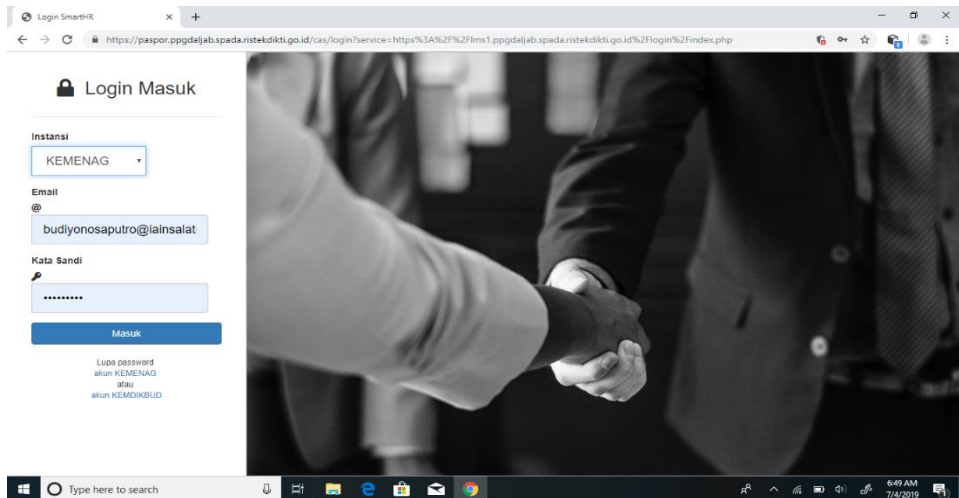
Figure 1.

SPADA Login

Figure 1 is the SPADA login to the Learning Management System. The required SPADA login are e-mail and password, and also click the KEMENAG option. For the SPADA login menu, click https://paspor.ppgdaljab.spada.ristekdikti.go.id/cas/login? After login is successful, you will be able to find the menu of the learning management system as on Figure 2.
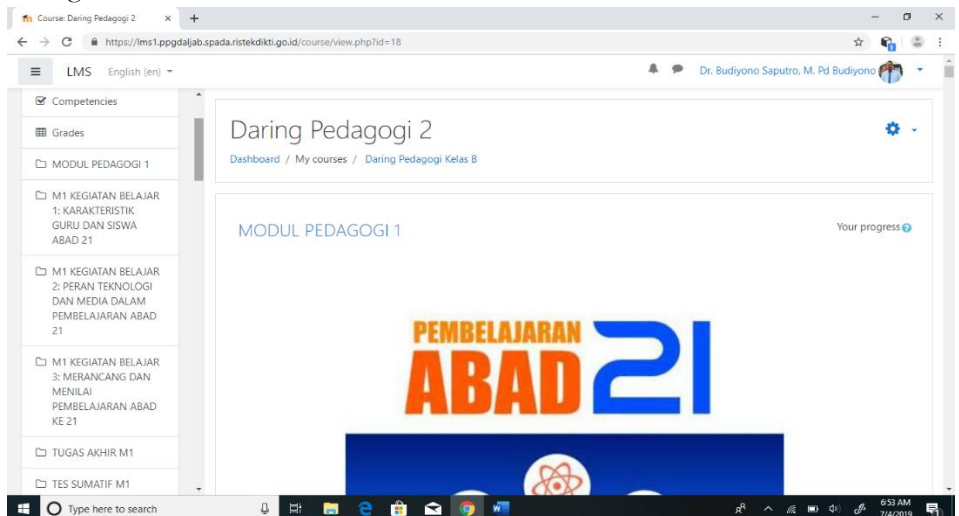

Figure 2.

Menu of SPADA Learning Management System

Figure 2 is the available menu that is related to the learning management system which consists of modules and contents, final assignments and contents, summative tests and contents, as well as assessments and the discussion forum. The menu of the learning system management is clearer as on Figure 3.
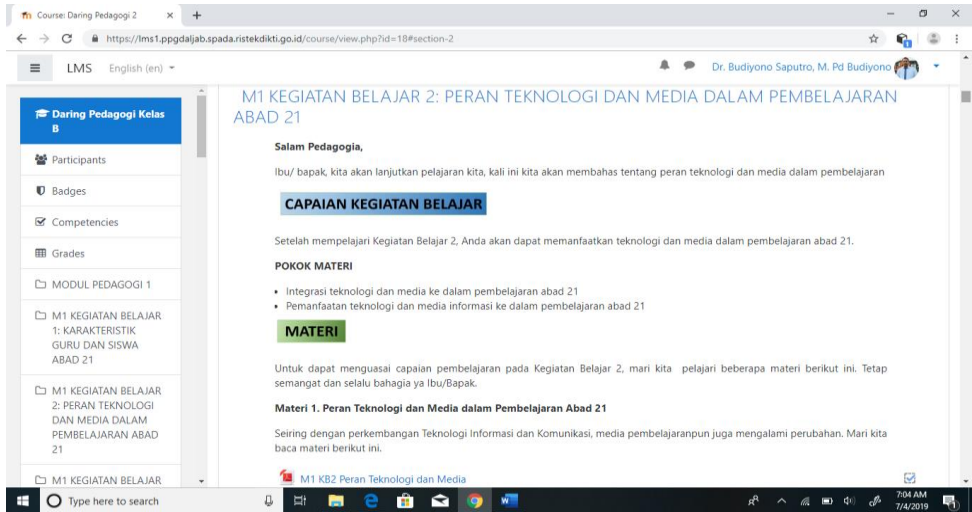
Figure 3.

Learning Materials of Learning Management System

Figure 3 is the menu of the learning management system for the learning module. The learning module consists of several learning activities. The contents of the module for one learning activity are: (1) the title of learning activities, (2) apperception, (3) achievement of learning activities, (4) points of material, (5) material, (6) learning videos. Students can freely access the menu on the learning. According to Lestari (2015), the results of her research show that the important features of the Learning Management System are the features of: administrative, delivery of teaching materials, testing, rating, and communication.

Figure 4.

Menu of Learning Management System for Final Assignment and Summative Test

Figure 4 is the menu of the final assignment and the summative test. The menu of the final assignment contains the instruction of the assignment that must be done online by students. After students finish and submit online, lecturers will be able to know and correct the assignments by giving feedback if there are inputs or suggestions. The next step is for lecturers to provide the score of the assignments, and scores can be directly accessed by students. While on the summative test, students can work after they read the modules, and do the final assignments on the learning activity modules. Questions are in the form of multiple choices. The instruction for working on the summative test menu are available and easily accessible. After students finish the summative test, the scores will automatically be stored in the system. Scores can be easily seen by students and lecturers in the menu of grades. This is in line with Ariesta (2012) which indicates that the features of the Learning Management System can support the e-learning method.
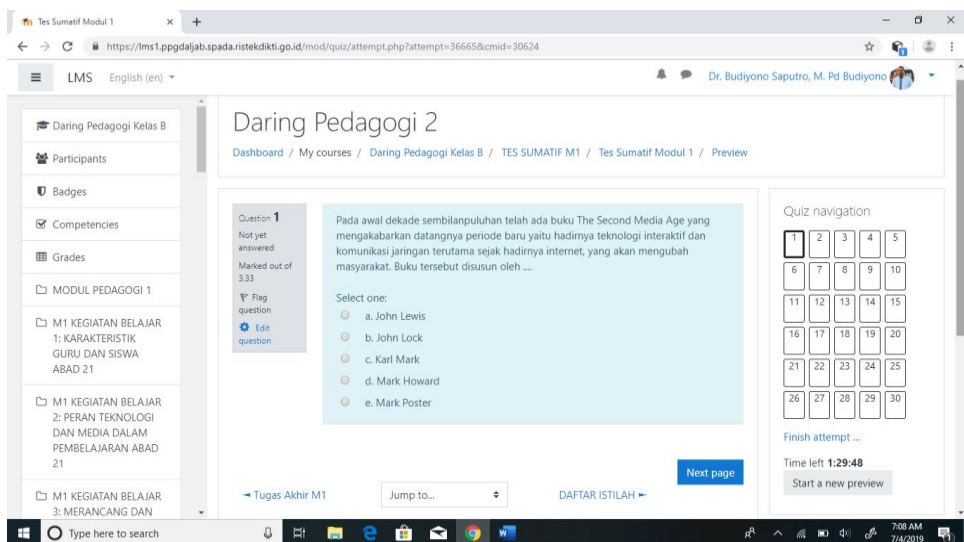

Figure 5.
Menu of Learning Management System for Summative Test

The menu of the learning management system for the summative test consists of questions, choice of answers, and the instruction to move to the next questions, as well as the navigation quiz. The students of PPG can work on the summative test by selecting the available answers. The summative test is only done once, and there is no repetition.
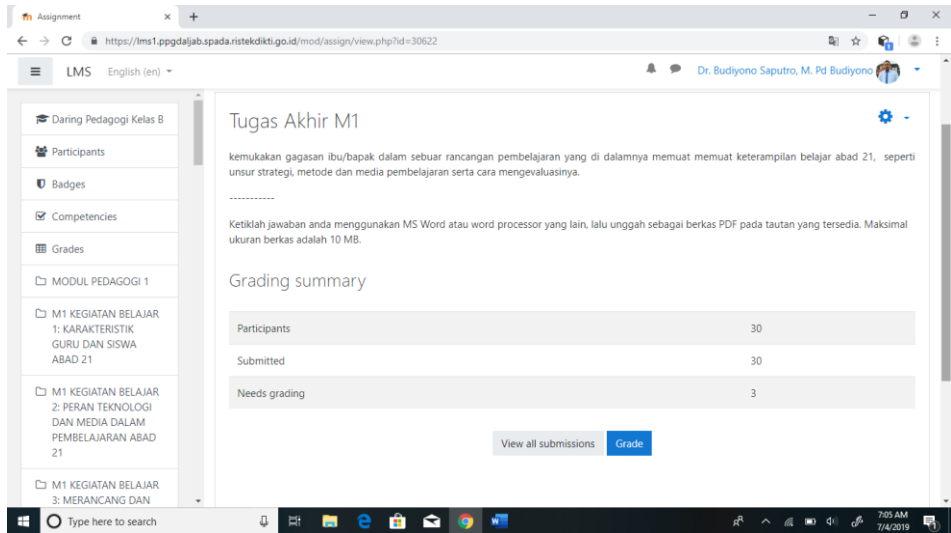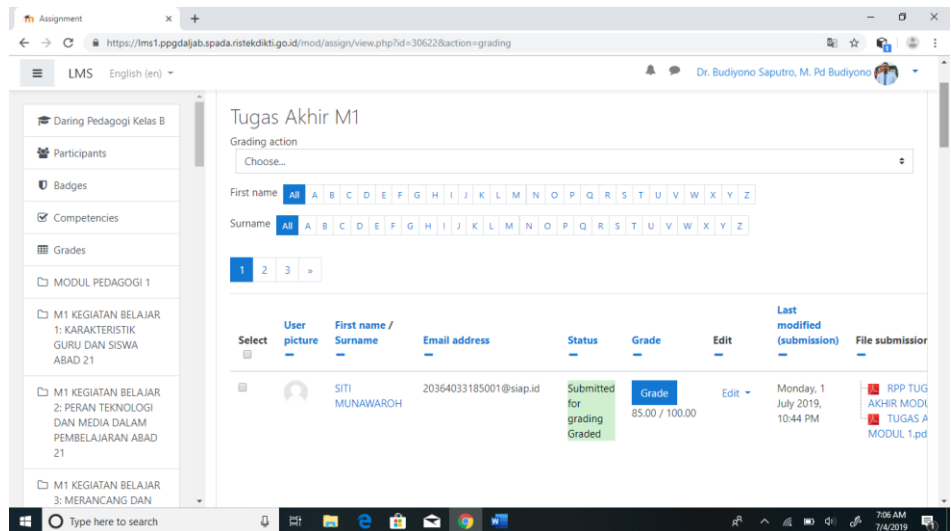
Figure 6.

Menu of Learning Management System for Final Assignment

Figure 6 is the menu of the learning management system for the final assignment containing the instruction of assignments for students, and the menu of filling-in and uploading. After students work on the assignments, lecturers can directly access the assignments to be corrected and to provide feedback and scores. After lecturers give the scores, students can directly access the scores as shown in Figure 7.

Gambar 7.

Menu of Learning Management System for Page of Grades

Figure 7 is the menu of the learning management system for the grades, consisting as follows: (1) name of the student, (2) picture/photo of the student, (3)

e-mail address, (4) grades, (5) date of task and file submission, and also (6) feedback and information. For more details, see Figure 8 below.
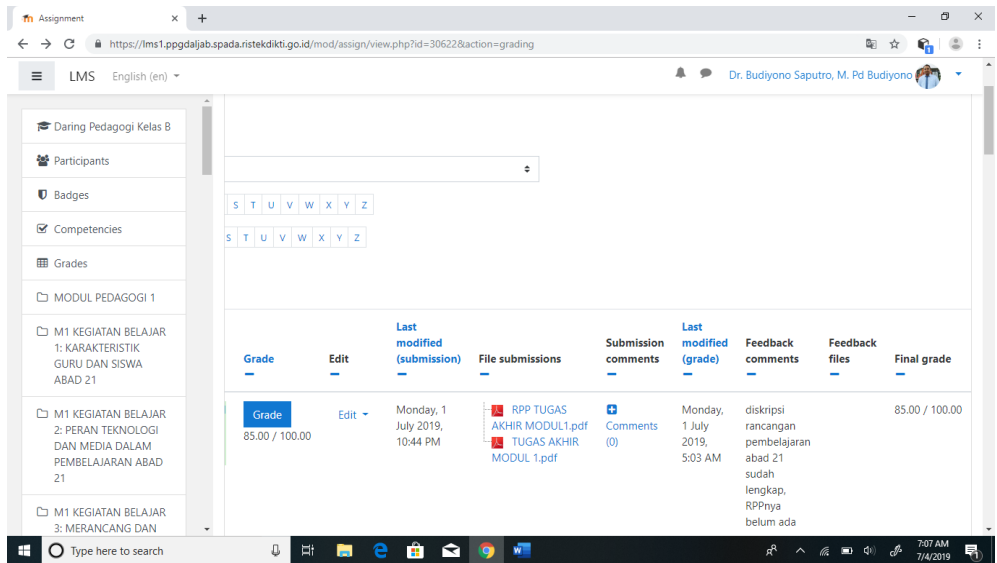

Figure 8.

Detail of Learning Management System for Aspect of Grades
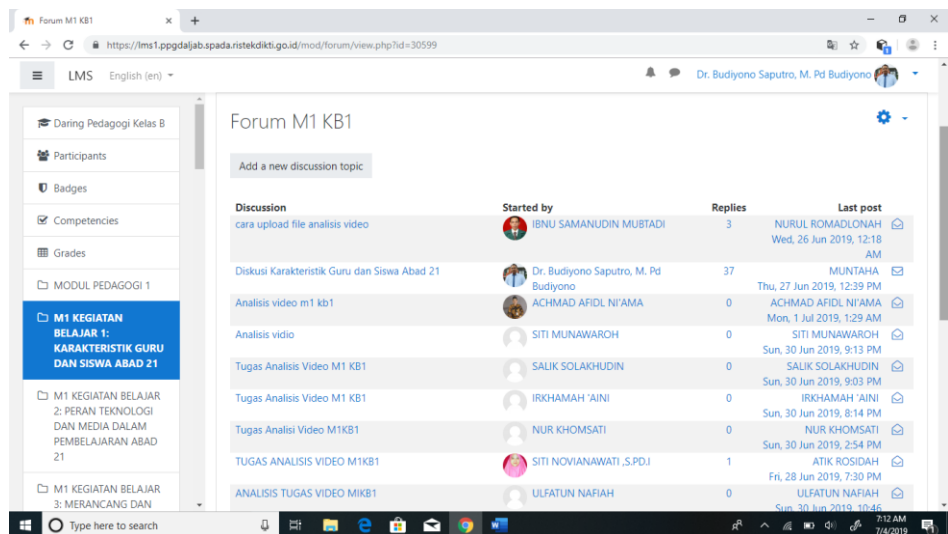
Figure 9.

Learning Management System for Aspect of Discussion Forum

The LMS for the aspect of the discussion forum includes several menus as follows: (1) Theme of discussion, (2) names who post, (3) number of discussions, and (4) time of discussion, and also (5) scores of discussion. In this discussion forum, the students of PPG get their scores from the results of the discussion. The content of the discussion, and by being active, adds them more score points. This

discussion forum increases their motivation to gain more score points. This is in line with Condea, *et al.* (2014), shows that An Evolving Learning Management System for New Educational Environments Using 2.0 Tools can increase the students' motivation and scores.

Method

Research Model
This is a quantitative research whose design is the *one-group pretest-posttest* (Sugiyono, 2009).

Sample
The sample of this research was purposive sampling. The sample was taken from the participants of the madrasa Teacher Profession Education (PPG) within the position at the IAIN Salatiga, Indonesia, in 2019. One group is 30 respondents.

Data Collection Tools
Data collection tools is questionnaire, formative essay, summative essay, discussion notes, pretest essay and posttest essay.

Data Analysis
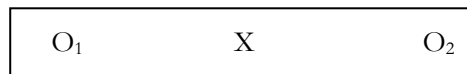Data analysis design is the *one-group pretest-posttest*. Therefore, the design is as on Figure 10.

O_1	X	O_2

Figure 10.

"One-group Pretest-posttest" Design

The design of *one-group pretest-posttest* with details that O_1 is the learning result of the scientific LMS. Meanwhile O_2 is the learning result of the summative LMS. The learning results of the scientific LMS and summative LMS are conducted by the data normality test. Next, the t test is conducted. The parametrical t test (paired t-test) is conducted if the data of the normality test results is distributed normally. The non-parametrical t test (Wilcoxon) is conducted if the data is not normally distributed. The t test is done using SPSS Window 22.

Results and Discussion

Application of Learning Management System (LMS) in SPADA
The LMS in In-Network Learning System (SPADA) consists of materials menu, formative tests, discussion forum, assignments, teleconference, and grades and also announcement. The applying of the LMS to the In-Network Learning System (SPADA) of pedagogical material for the participants of the Teacher Profession Education (PPG) in the position of madrasa teacher at the Education Institute of Educator (LPTK) in 2019, by giving questionnaire about the simplicity, practicality, and effectiveness. The questionnaire with three indicators is as on Table 2.

Table 2.

Application of Learning Management System in SPADA

No.	Indicator	Respondent	Score	
			1	0
1	The simplicity of the LMS on the Network Learning System (SPADA) of the pedagogical material for the participants in the Teacher Profession Education (PPG) in the position of madrasa teacher in 2019	30	30	0
2	The practicality of the LMS on the Network Learning System (SPADA) of the pedagogical material for the participants in the Teacher Profession Education (PPG) in the position of madrasa teacher in 2019	30	30	0
3	The effectiveness of the LMS on the Network Learning System (SPADA) of the pedagogical material for the participants in the Teacher Profession Education (PPG) in the position of madrasa teacher in 2019	30	30	0

Therefore, the graph of the LMS application with the elements of simplicity, practicality, and effectiveness, is as on Figure 11.
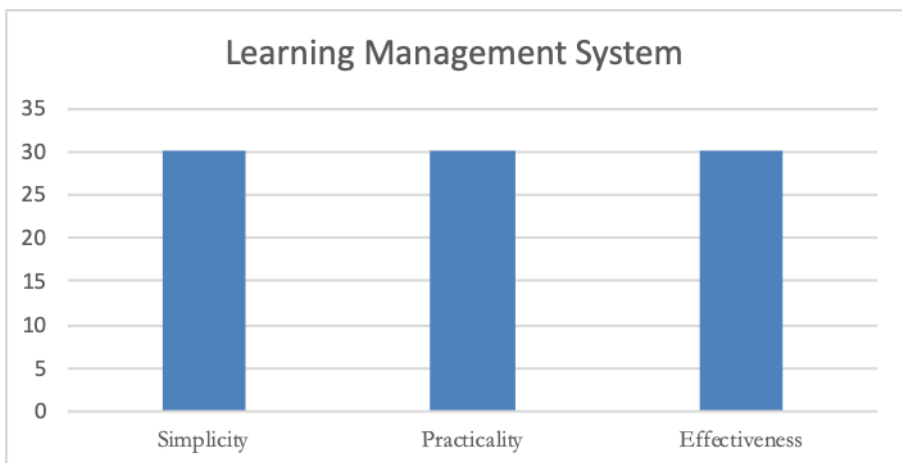
Figure 11.

Graph of LMS Application

Based on Table 2 and Figure 11, the assessment of PPG participants in the Madrasa teacher position, as much as 30 people, proven that the LMS in the SPADA is simple, practical, and effective. This is according to Ambarita (2016)

who states that e-learning simplifies lecturers in delivering materials and evaluating, when the lecturer is unable to attend, and simplifies Students and Lecturers to interact with each other, anytime and anywhere, in improving the students learning quality. While Puji Rahayu (2018) shows that there are significant changes in the number of lecturers who have e-learning accounts after the policy implementation related to the use of e-learning in the process of teaching and learning.

Scientific-Based LMS

The LMS in the SPADA consists of menus of formative tests, discussion forum, and final assignments. Those three menus are the interpretation of the scientific approach. Therefore, more details on the scientific-based LMS in the SPADA are as on Table 3.

Table 3.
Description and Results of Assessment of Scientific-Based LMS

No.	LMS Menu	Scientific Element	Score	
			1	0
1	Formative Test	Observing	30	0
2	Discussion Forum	Questioning, reasoning, communicating	30	0
3	Final Assignment	Attempting/trying	30	0

The Table 3 is the scores of the total activities from the interpretation of the scientific approach in the LMS Menu, and Figure 12 is the graph.
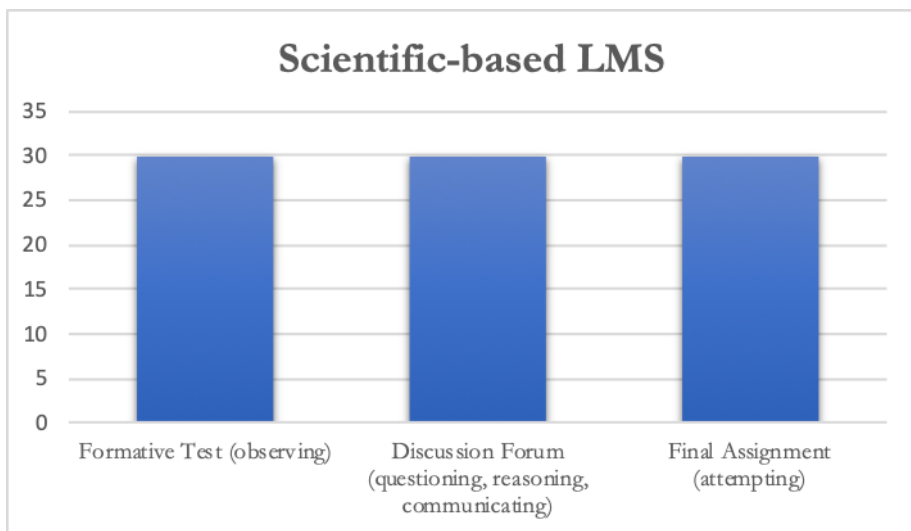

Figure 12.
Interpretation of Scientific-Based LMS

The scientific-based LMS in the SPADA can be found on the formative tests, discussion forum, and final assignments. On the menu of formative test, the appearing scientific aspect is that the PPG participants read and observe the questions they work on. While on the menu of discussion forum, the appearing scientific aspects are questioning, reasoning, and communicating opinions. On the menu of final assignment, the appearing scientific aspects is that the PPG participants attempting or trying to create the actual final assignment.

Descriptive of Scientific-Based LMS in SPADA

The implementation of the scientific-based LMS in the SPADA is interpreted in activities of formative test, discussion forum, and final assignment. Therefore, the learning results from those three indicators are as on Table 4.

Table 4.

Descriptive of Scientific-Based LMS in SPADA

		Formative test	Discussion forum	Final assignment
N	Valid	30	30	30
	Missing	0	0	0
Mean		95.0000	86.8167	93.4333
Median		95.0000	87.0000	93.0000
Mode		95.00	86.00	93.00
Std. Deviation		5.25226	1.08662	1.97717
Minimum		80.00	85.00	90.00
Maximum		100.00	88.50	97.00
Sum		2850.00	2604.50	2803.00

Based on Table 4, the scientific-based LMS in the SPADA for the formative test (observing) is averagely 95; for the discussion forum (questioning, discussing, and reasoning) is 86.8167; and for the final assignment (attempting) is 93.

Effectiveness of Scientific-Based LMS in SPADA on Pedagogical Learning Results

 a.   Descriptive of Learning Results of Scientific-Based LMS and Summative

The scientific-based LMS of pedagogical material consists of activities such as formative test, discussion forum, and final assignment, can be realized in learning result. While to determine the effectiveness, the comparison is the summative learning result. Therefore, the descriptive of the learning results of the scientific-based LMS on the summative learning results, are as on Table 5.

Table 5.

Descriptive of Learning Results of Scientific-Based LMS and Summative

		Learning Result of Scientific-Based LMS	Learning Result of Summative
N	Valid	30	30
	Missing	0	0
Mean		91.9333	78.8333
Median		92.0000	78.5000
Mode		92.00	77.00
Std. Deviation		2.14851	9.90327
Minimum		86.00	40.00
Maximum		95.00	97.00
Sum		2758.00	2365.00

Based on Table 5, the descriptive of the learning results of the scientific-based LMS is averagely 91.93, the median is 92.00, and the modus is 92.00; meanwhile, the summative learning results is averagely 78.83, the median is 78.50, and the modus is 77.00; based on those results, then the learning results of the scientific-based LMS have higher average compared to the summative learning results. The descriptive difference can be seen on Figure 13 and 13.
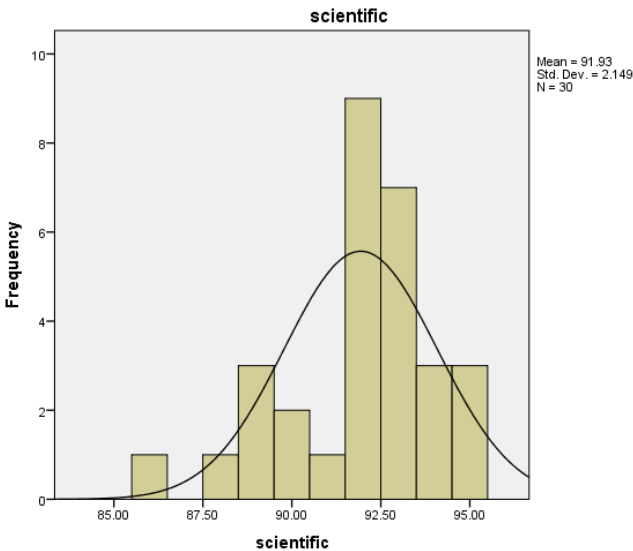

Figure 13.
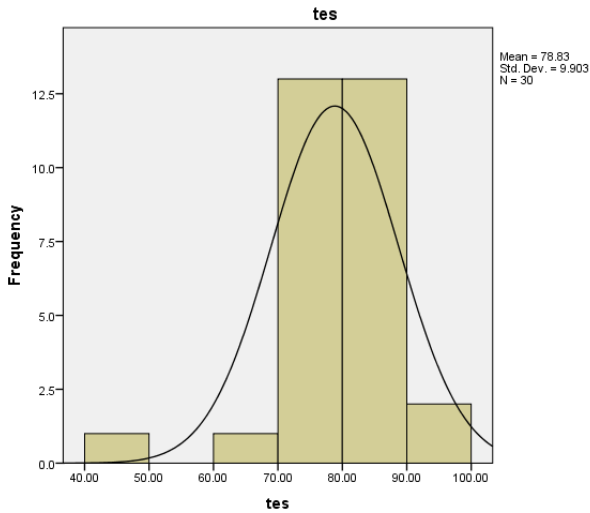*Histogram of Learning Results of Scientific-Based* LMS

Figure 14.
Histogram of Summative Learning Results

The descriptive of learning results of scientific-based LMS is more effective than the summative learning results. It is in line with Saregar (2016) who states that the learning of quantum physics introduction using the Phet simulation media and LKM via scientific approach can increase the students' interest and conceptual mastery. According to the research by Rudyanto (2014), shows that the learning equipment of the learning discovery model with scientific approach filled-in character can increase the valid, practical, and effective way of creative thinking. Meanwhile Lonn & Teasly (2009) state that the Learning Management System can be efficient in the communication of the instructors learning practice, and students also very appreciate the teaching and learning tools in the LMS. According to Sari & Ferdiansyah (2005), state that the implementation and integration of the learning management system application and Grid Computing can improve the online course effectiveness.

b. Wilcoxon Test

First of all, the data normality test is conducted, in the hypothesis test of the scientific-based LMS effectiveness on the summative LMS learning results. Therefore, the results of the data normality test are as on Table 6.

Table 6.
Data Normality Test of Learning Results of Scientific-Based LMS and Summative LMS

	Shapiro-Wilk		
	Statistic	df	Sig.
Learning Result of Scientific-Based LMS	0.915	30	0.020
Learning Result of Summative LMS	0.811	30	0.000

Based on Table 6, the results of normality test show that the significance (p) < 0.05, so it can be concluded that the data is not normally distributed. Hence, the hypothesis test uses the non-parametrical different test (Wilcoxon test). The results of Wilcoxon test are as on Table 7

Table 7.
Wilcoxon Test Results

Test Statistics*	
	Learning Results of Scientific-Based LMS – Summative Learning Result
Z	-4.725[b]
Asymp. Sig. (2-tailed)	0.000
a. Wilcoxon Signed Ranks Test	
b. Based on positive ranks.	

Based on the Wilcoxon test on Table 7, the Z = -4.75, with the significance (p) = 0.000 < 0.05; therefore, the alternative hypothesis is accepted, which means that the scientific-based LMS on the SPADA is effective on the summative learning results of pedagogical material for the PPG participants of Madrasa at IAIN Salatiga, Indonesia.

Conclusion

The results of the implementation the scientific-based LMS in the SPADA on field can show the learning characteristics which are practical, effective, and simple, in the implementation. Many studies confirmed effective and efficient of SPADA, such as Chatwattana & Nilsook (2017) were shown web-based learning system is a flexible teaching activity and learning management system, students can get efficient learning from the system. Especially there various communication devices to support and promote collaboration and activities in the system. According Khlaisang & Koraneekij (2019) that information communication and technology literacy (ICT Literacy: ICTL) it can be improved or enhanced for online learning in a ubiquitous learning context such as e-learning effectively. Ramadhani, *et. al* (2019) shown digital-based learning with the model of Flipped-Problem Based Learning

based on LMS-Google Classroom provides a new experience and experienced a significant increase for second-level students in High School. Parlakkilic (2013) shown change management in the transition to e-learning systems considering pedagogical. The practical characteristics of the LMS on learning can be shown by accessibilities of communication, discussion, assignment submission, formative test, summative test, and assessment. The effective characteristics can be shown on the information speed and simplicity, and the remote learning system. Besides, the LMS which has been integrated to the scientific approach, is effective on the learning results of the pedagogical material summative learning of the participants of Madrasa PPG at the IAIN Salatiga, Indonesia, in 2019. This can be proven on the Wilxocon test which is $Z = -4.75$, with the significance $(p) = 0.000 < 0.05$. the scientific-based LMS is on the menus of formative test (observing), discussion forum (questioning, discussing, reasoning), and final assignment (attempting). Based on those, then the scientific-based LMS in the SPADA can be implemented on other courses, and also on other education levels.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

Almarashdeh I. A., Sahari, N., Mat Zin, N. A. & Alsmadi, M. (2010). The Success of Learning Management System Among Distance Learners in Malaysian Universities. *Journal of Theoretical and Applied Information Technology*, *21*(2), 80–91.

Anggraeni, M. K. P. R. D. (2017). Information and Communication Technology (ICT) Use in Teaching and Learning in Higher Education Business Schools. *A Comparative Study. (Doctoral),* Charles Darwin University, Darwin.

Ambarita, A. (2016). Implementasi Sistem E-Learning Menggunakan Software Moodle Pada Politeknik Sains dan Teknologi wiratama Maluku Utara. *Indonesian Journal on Information System*, *1*(2), 47-58.

Ariesta, A. (2012). Kajian Learning Management System (LMS) dengan Qualitative Weight and SUM (QWS): Studi Kasus D3 Unggulan Universitas Budi Luhur. *BIT*, (9)2, 10-17.

Astutik, S & Prahani, B. K. (2018). The Practicality and Effectiveness of Collaborative Creativity Learning (CCL) Model by Using PhET Simulation to Increase Students' Scientific Creativity. *International Journal of Instruction*, *11*(4), 409-424.

Chatwattana, P & Nilsook, P. (2017). A Web-based Learning System using Project-based Learning and Imagineering. *International Journal of Emerging Technologies in Learning (iJET)*, *12*(5), 4-22.

Coates, H, James, R & Baldwin, G. (2005). A critical Examination of the Effects of Learning Management Systems on University Teaching and Learning. *Tertiary Education and Management, 11,* 19–36.

Condea, M, A., Garcia-Penalvoa, F., J., Rodríguez-Condea, M.J., Alierb, M., Casanyb, M.J & Piguillemb.J. (2014). An evolving Learning Management System for new educational environments using 2.0 tools. *Interactive Learning Environments*, *22*(2), 188–204.

Darmayanti, T. (2007). E-Learning pada Pendidikan Jarak Jauh: Konsep yang mengubah Metode Pembelajaran di Perguruan Tinggi di Indonesia. *Jurnal Pendidikan Terbuka dan Jarak Jauh*, *8*(2), 99-113.

Falloon, G. (2011). Exploring the virtual classroom: What students know (and teachers should consider). *Merlot Journal of Online Learning and Teaching*, *7*(4), 439-451.

Hanum, N.S. (2013). Keefektifan E-Learning Sebagai Media Pembelajaran (Studi Evaluasi Model Pembelajaran E-Learning SMK Telkom Sandhy Putra Purwokerto). *Jurnal Pendidikan Vokasi*, *3*(1), 90-102.

Horton, W. (2006). *E-learning by Design*. San Fransisco: Pfeiffer.

Huda, M.N, Chaeruman, U.A, Aji, S.D, Huda, C., Yusro, A.C., Kumala, F.N, Wartono, Nandiyanto, A. B. D., & Abdullah, A. G. (2018). SPADA: Online learning between universities of PGRI Indonesia. *MATEC Web of Conferences*, *197,* 03002.

In'am, A & Hajar, S. (2017). Learning Geometry through Discovery Learning Using a Scientific Approach. *International Journal of Instruction*, *10*(1), 55-70.

Kakasevski, G, Mihajlov, M, Arsenovski, S, & Chungurski, S. (2008). Evaluating Usability in Learning Management System Moodle. *Proceedings of the ITI 2008 30th Int*. Conf. on Information Technology Interfaces, 613-618.

Khlaisang, J & Koraneekij, P. (2019). Open Online Assessment Management System Platform and Instrument to Enhance the Information, Media, and ICT Literacy Skills of 21st Century Learners. *International Journal of Emerging Technologies in Learning (iJET)*, *14*(7), 111-127.

Lestari, I. (2015). Evaluasi Fungsionalitas Learning Management System Berdasarkan ISO/IEC 9126-2. *Jurnal Sains, Teknologi dan Industri*, *13*(1), 123-129.

Lonn, S., & Teasly, S.D. (2009). Saving time or Innovating Practice: Investigating Perseptons and Uses of Learning Managament System. *Computers & Education, 53,* 686-694.

Lopes, A.P. (2014). Learning Management Systems in Higher Education. Polytechnic Institute of Porto (IPP)/ISCAP/CICE (Portugal). *Proceedings of Edulearn14 Conference 7th-9th*, Barcelona, Spain, 5360-5365.

Mu'arif, H. A & Surjono, H. D. (2016). Pengembangan e-learning berbasis pendekatan ilmiah pada mata pelajaran ipa di smp negeri 5 yogyakarta. *Jurnal Inovasi Teknologi Pendidikan*, *3*(2), 195-206.

Muazizah, N.M., Nurhayati, S., & Cahyono, E. (2016). Keefektifan Penggunaan E-Learning Berbasis Moodle Berpendekatan Guide Inquiry Terhadap Hasil Belajar Siswa. *Jurnal Inovasi Pendidikan Kimia*, *10*(2), 1760–1768.

Parlakkilic, A. (2013). E-Learning Change Management: Challenges and opportunities. *Turkish Online Journal of Distance Education-TOJDE*, *14*(4), 54-68.

Puji Rahayu, M. K. (2018).Peta Penggunaan E-Learning oleh Dosen Fakultas Ekonomi dan Bisnis Pasca Hibah SPADA. *Jurnal Manajemen Bisnis*, *9*(2), 175 -192.

Ramadhani, R, Umam, R, Abdurrahman, & Syazali, M. (2019). The Effect of Flipped-Problem Based Learning Model Integrated with LMS-Google Classroom for Senior High School Students. *Journal for the Education of Gifted Young Scientists*, *7*(2), 137-158.

Rudyanto, H. E. (2014). Model Discovery Learning dengan Pendekatan Sainstifik Bermuatan Karakter untuk Meningkatkan Kemampuan Berpikir Kreatif. *Premiere Educandum*, *4*(1), 41-48.

Rufaidah, E., AtIrsyadi, K. A., Saregar, A., & Umam, R. (2018). The Effect of HALAL Label to Increase Domestic and International Tourism: Case Study In Lombok, Indonesia. *International Journal of Management and Business Research, 8*(4), 29–36.

Saputro, B. (2017). *Model Pendekatan Saintifik dalam Kehidupan Sosial Keagamaan Masyarakat Kampung Mualaf*. Jakarta: Rajagrafindo.

Saregar. A. (2016). Pembelajaran Pengantar Fisika Kuantum dengan Memanfaatkan Media Phet Simulation dan LKM Melalui Pendekatan Saintifik: Dampak pada Minat dan Penguasaan Konsep Mahasiswa. *Jurnal Ilmiah Pendidikan Fisika Al-BiRuNi*, *5*(1), 53-60.

Sari, F. S., & Ferdiansyah, C. (2005). Implementasi dan Integrasi Aplikasi Learning Management System dan Grid Computing untuk Meningkatkan Efektifitas Online Course. *Jurnal IMS and Grid Computing*, 1-6

Setiawan, R. (2013). E-Learning Moodle Untuk Meningkatkan Motivasi dan Hasil Belajar Teknologi Informasi dan Komunikasi Tingkat SMP. *Jurnal Ilmiah Guru "COPE"*, 1(XVII), 1-7.

Sudiana, R. (2016). Efektifitas Penggunaan Learning Management System Berbasis On Line. *JPPM*, *9(*2), 201-209.

Sugiyono. (2009). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan Research & Development)*. Bandung: Alfabeta.

Sulistiyono, A. (2014). *Penerapan Pendekatan Saintifik dengan Media realita untuk meningkatkan Hasil Belajar Matematika Siswa Kelas V SD Negeri Blotongan 03 Kecamatan Sidorejo Kota Salatiga Semester II Tahun Pelajaran 2013/2014*.

Suteja, B.R., Guritno, S., Wardoyo, R., & Ashari, A. (2010). Personalization Sistem E-Learning Berbasis Ontology. *Makara, Sains*, *14*(2), 192-200.