DEVELOPMENT OF LMS-INTEGRATED DIGITAL LEARNING OBJECT (LO) FOR BLENDED LEARNING AND QUALITY EDUCATION

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Abstract

At the higher education level, several institutions have implemented blended learning, this could be a concern in responding to advances in technology and education to remain competitive and innovative. Keeping up with current technological advances often not only brings financial challenges but also to plan in fulfilling the components of the support system in implementing blended learning. This study reveals how the need for digital-based learning objects and the basic criteria for LO in implementing blended learning. Learning objects that are easily integrated with the Learning Management System (LMS) system are the LO developed in this study. The purpose of this research is to reveal the need for digital-based learning objects that are integrated into the LMS in the Fundamentals of Educational Technology course and formulate minimum requirements for integrating LO into LMS. This research is a Research and Development (R&D) model using the ADDIE method as a source of data from students and lecturers in the Basics of Educational Technology course. Based on the results, it is known that the needs analysis is in a digitally integrated LMS-based LO. The findings of this study reveal the need for digital-based LO and the minimum criteria for developing digital-based LO in the DDTP blended learning model course.

Keywords: Learning Object, Digital Learning Object, Blended Learning, Quality Education, Educational Access.

1. INTRODUCTION

After the Corona Virus Disease (Covid-19) Pandemic, learning methods in tertiary institutions underwent a change implemented blended [1]. For this reason, Higher Education is expected to carry out the process of teaching and learning activities in a blended learning manner using the LMS. The planning for implementing blended learning includes six things, namely the design of learning experiences, learning composition, learning strategies, learning implementation guides, program maps and teaching materials[2].Technological developments in existing learning allow for online (in-network) or online learning. One form of technology that can facilitate this kind of activity is a Learning Management System (LMS). LMS is a web-based system that allows teachers and students to share learning materials, make class announcements, collect and return assignments, and communicate with each other [3].

The application of blended learning which includes face-to-face and online support is needed in the delivery of learning materials, especially in online form. During the post-pandemic COVID-19, many ways have changed in approaching learning. Several educational institutions have adopted the blended learning model. The availability of blended learning support system components is a key factor in determining whether a new learning method can be successfully implemented. Other factors such as the lack

of digital infrastructure also hinder the implementation of online learning and blended learning[4].

The pandemic provides new opportunities to manage learning challenges and ways to innovatively develop online learning. Internationally, the pandemic can be a catalyst for the development of even more massive, blended learning. Because the pandemic does not discriminate demographically or geographically, the pandemic has made literate institutions with infrastructure a component of online learning support systems. Despite these challenges, the available supporting content must be in accordance with the characteristics of online learning and blended learning. To support blended learning, universities are expected to be able to organize online learning using a structured and integrated Learning Management System [5].

The Learning Management System is a tool or system that can be used in online learning [6]. Padang State University has developed a Learning Management System that can be used by students or lecturers as a mode that can be used in theoretical learning[7]. The LMS developed by Padang State University is called UNP e-learning which can be accessed on the http://elearning2.unp.ac.id page. e-learning2 is created using the Modular Object-Oriented Dynamic Learning Environment (MOODLE), a popular software that is widely used for the development of electronic learning media on the Internet.

However, this e-learning application has not been used optimally in the learning process, especially in Basic Educational Technology (DDTP) courses. This is due to the unavailability of e-learning Objects that are ready to be applied to LMS under good standards. Previously, digital-based LO development had only been carried out on LO digitization from print-based LO. Meanwhile, students need the availability of integrated learning materials in the LMS for blended learning.

One of the uses of the e-learning LMS is used by students in the DDTP course. The subject matter of DDTP is one of the contents of the course that prepares educational students to fill in competencies as prospective professional teachers[8]. In addition, the learning of this course which is carried out using an online system makes teaching materials ideally easily accessible and easily understood by students [9] on the LMS that has been developed by the University.

The provision of this innovative Learning Object can also answer blended learning that is currently being carried out through the provided LMS. The provision of Learning Objects for blended learning has special characteristics in LMS. LO Blended learning must be able to accommodate and connect two activities between online and offline activities [10]. The development of teaching materials consisting of handouts, powerpoints and short learning videos is expected to increase student learning motivation online by combining visual and audio-visual learning. Apart from that, the idea of developing an integrated Learning Object through LMS can also be used as online learning material which is made as a form of learning adaptation.

2. LITERATURE REVIEW

Digital Learning Object

Digital Learning Objects are one of the innovations in the world of education[11][12] that are increasingly popular and widely used by educators. In today's digital era, digital Learning Objects are an effective and efficient alternative in the teaching and

learning process. The use of digital teaching materials is increasingly popular in the world of education today. Some examples of digital teaching materials that are commonly used are learning videos, e-books, simulation programs, learning games, educational applications, presentations, and podcasts[13].

Digital teaching materials have an important role in supporting the acceleration of student learning [14]. Especially students in the slow learner group According to Jenson (1980), students with IQ scores between 80 and 90 are considered slow learners, and they have a difficult time understanding anything that is taught to them, especially symbolic subjects, abstract, or conceptual[15], digital teaching materials can help with these limitations.

Blended learning

Submission of learning programs delivered online has become a necessity in current learning[16]. This is because of the development of online learning which offers a variety of learning media and the flexibility of time and place. However, online learning also has certain weaknesses[17][18]. The role of technology in online learning is as a tool to facilitate educators in teaching students, but not all can be accommodated with online learning. This gave birth to learning that mixes online learning with face-to-face learning, which is called Blended Learning. Blended Learning is a combination of face-to-face and online meetings [17]. Blended learning is currently increasingly supported by the hadith of the LMS (Learning Management System) which makes it easy to organize Learning Objects in online learning.

Blended learning is not only about combining learning, what cannot be missed in the application of blended learning is learning messages as learning objects that are conveyed so that there is no overlap between face-to-face and online learning[19].

So that blended learning can run as expected, learning objects are designed according to the principles to achieve learning objectives[20]. Minjuan Wang and Ruimin Shen (2011) see the importance of developing pedagogies and learning object principles adapted to the needs of a blended learning environment. That is, in optimizing the use of technology in learning, it is necessary to pay attention to the principles of designing learning objects that are integrated with the LMS used[21].

3. METHOD

The research method used is the Design research model, the Model bridges the development of theory with practice and produces applicable and practical learning designs. On the other hand, design research can produce a theory (grounded theory) based on the experimental practice of a design.

According to Plomp [22], there are three results that can be obtained from design research, namely design principles and intervention theory. Design research aims to generate knowledge about whether and why an intervention works in a particular context. design research includes the steps of analysis, design, evaluation and revision.

In this study, the data sources that will be used are data sources from students and lecturers in the Basics of Educational Technology course as users of Digital Learning Objects related to the Learning Objects being developed. The population in this research is all students who take DDTP courses in the semester January-June 2023 then the sample is as much as 120 students taken by random sampling. The data

used in this study is as collection from observations and questionnaire data as validity test questionnaires, practicality.

The initial stage was an analysis of the needs of students and lecturers towards the needs of Digital Learning Objects that were integrated with the LMS through the distribution of student needs questionnaires. the needs questionnaire comprises indicators as in the table 1

Table 1: Indicators for analysing students' needs for Learning Objects

ISO dimension	Proposed hybrid model
Needs analysis and Framework analysis	Preparation of organizational and system changes
Conception/design	Setup base course and train users for the base course
Development/production	Development LO content, peer review of LO, multimedia development
Implementation and Learning process	Student learning using weekly published lectures
Evaluation/optimization	Assessment using performance metrics

Data from students and lecturers needs analysis as a formula for developing digital-based Learning Objects The next step is to carry out a digital-based LO Design that is integrated with the LMS, in this stage an LO design is produced which is ready for the validation stage.

4. RESULT AND DISCUSSION

The initial stage of creating e-learning content is an analysis of the content of the DDTP course material. In the analysis stage, an analysis of the needs of students and lecturers of the course is carried out to identify the need for creating e-learning content.
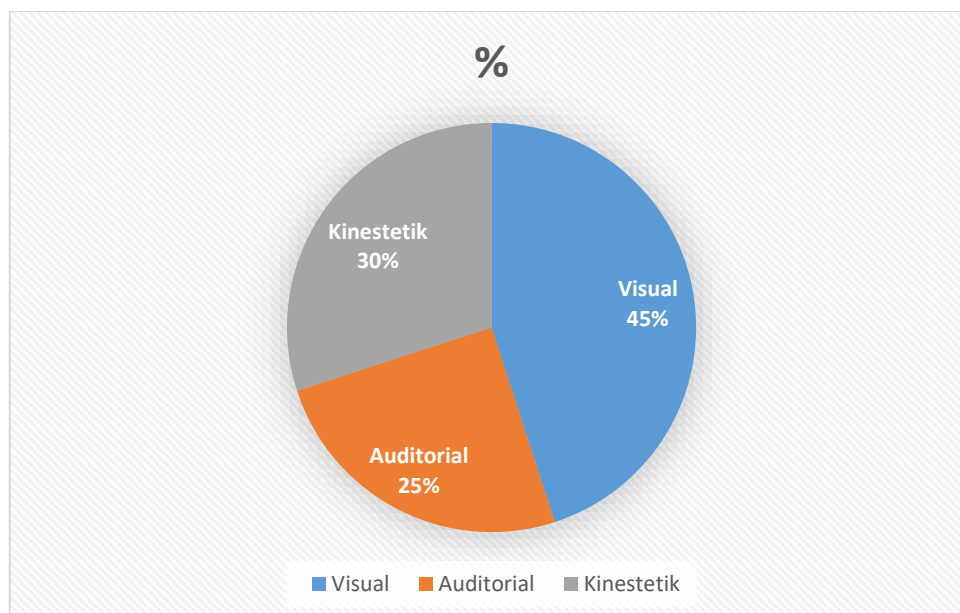

Figure 1: The tendency of students' Content LO interest

Visual Auditory Kinaesthetic Total Provision of teaching materials using LMS to support the teaching and learning process needs to refer to considerations. The characteristics of teaching materials that need to be considered in integration in LMS are.

Updated Content Development

Content development is an important part of the learning process with LMS. LMS that follow developments in the world of education will certainly be more useful than those that do not. For example, LMS A already has learning content around the Free Learning Curriculum, while LMS B does not yet.

Easily Accessible

The content integrated with the LMS is accessible to all individuals, and the technology used for the LMS is available to all users. For example, if some students do not have the latest Macromedia Flash plug-in, then students will not see the video simulation in the LMS using the latest version of Flash, or if the table structure you are using is for browser 5.0. and students have browser 4.0, they may not access the information they need.

Able to Provide Formative and Summative Assessments

To provide assessments to students, you must be able to take advantage of the LMS system for formative and summative assessments. In this case, it will include multiple choice testing, collaborative assignments, feedback and so on. Teaching materials in LMS are linked to various teaching and learning resources such as Interactive Videos, eTextbooks, eWorkbooks, eTeachersGuides, eTestpapers, and many more. Not only that but Explore Science also provides an overview of learning behaviour that can be monitored by lecturers.

LMS integrated the LO design concept for blended.

The concept of developing a digital-based LO is developed based on the needs analysis carried out, the needs analysis includes the characteristics of students as digital-based LO users. Student characteristics include student learning systems that are required to study exploratory independently, and the tendency to choose media formats.

After paying attention to the characteristics in the development of LO, paying attention to the aspects of The Instructional Design of Learning Objects is important because it is related to the components in the LO, for example, evaluation related to the LO, project or team adjustments [23].

The next aspect is Pedagogical Design, Design for Interaction Information Design, Interface design, this is related to how the learning design will be carried out using the LO that will be used. Aspects of Device Learning Design are also very important in building LO that is related to LO accessibility, which is integrated with LMS, accessibility includes control, image, and Motion control.

The next aspect is Learning Style Accommodation, this is related to the results of the need analysis that has been carried out, namely looking at the tendency of users' learning styles in learning to use digital-based LO. Digital-based LO must accommodate the learning styles of users so that students are more interested and happier in participating in learning using LO. Based on the results of the needs analysis and literature review conducted, it was found that a conceptual framework for the development of LMS-integrated LO can be seen in the following chart.
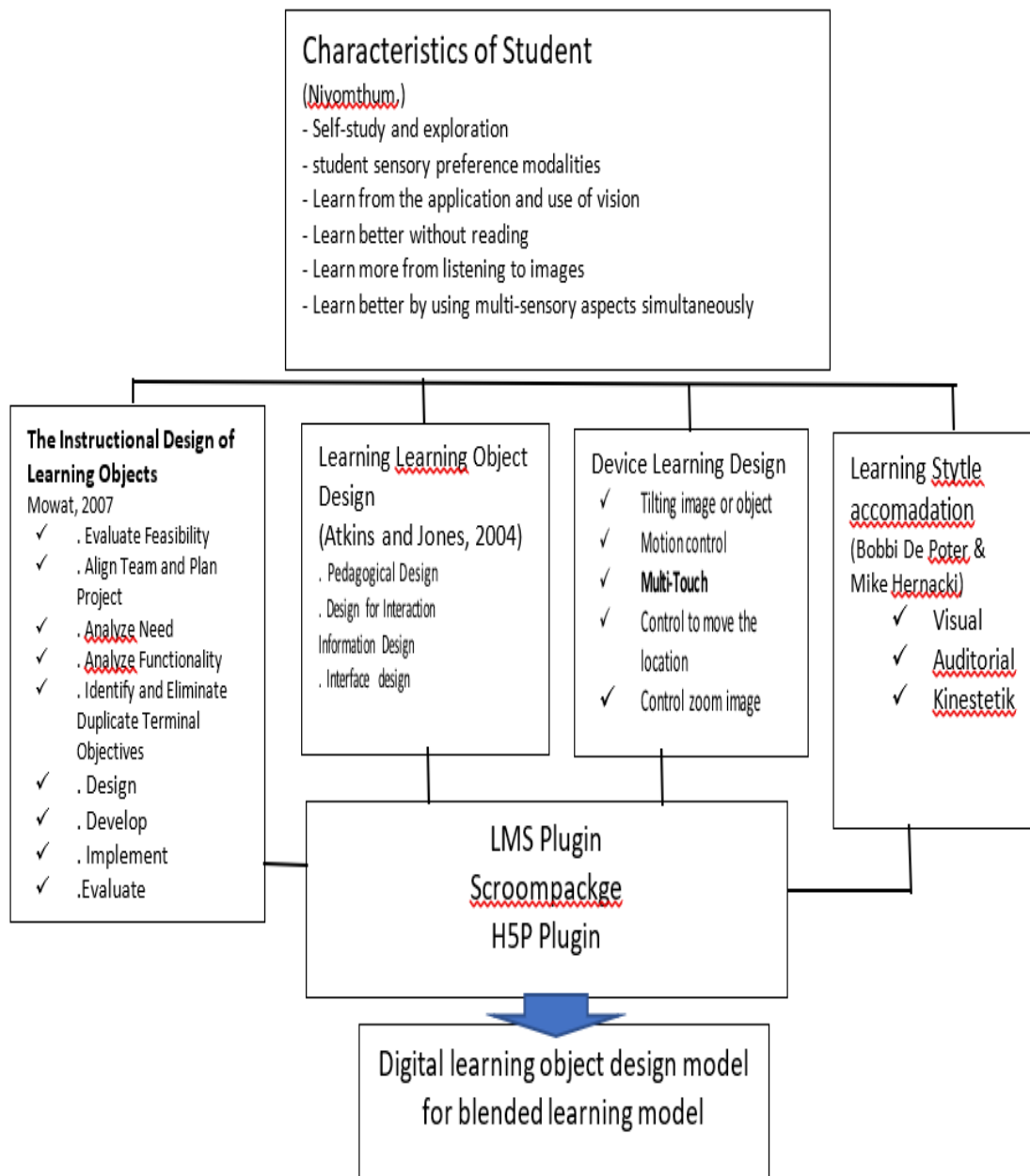
Figure 2: LMS integrated digital-based LO compiling indicator scheme.

The development of a digitally integrated LMS-based LO produces several recommendations that are supported by the plugins available in the LMS, including media with the FLIP type. that supports flip media.

Scroll Integration between learning modules and the e-learning system is carried out through the learning module management feature in the learning management system (LMS) virtual space. The following is a flip media-based LO design in LMS Moodle e-learning 2 UNP.

Figure 3: The FLIP-based LO design at UNP's e-learning LMS.

Modules are distributed by LMS in the form of SCORM or Shareable Content Object Reference Model. SCORM contains content with many variations, including videos, games, simulations, text, images, animations, or a combination thereof. In contrast to content that is distributed using pages in the LMS virtual space; content packaged in SCORM can be added HTML objects and JavaScript code. HTML Objects can be buttons, links, animations, web pages, frames, and so on. This object can be enhanced using JavaScript code.

Modules such as SCORM are more convenient when accessed using plugins that are already available in the e-learning LMS compared to being accessed directly via a web page. LMS can also be accessed via an Android-based application. The following LO components are based on the SCORM plugin Figure 3. The FLIP-based LO design at UNP's e-learning LMS
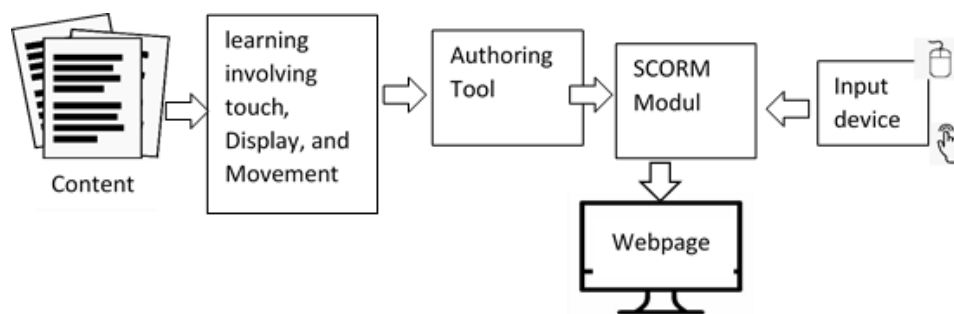

Figure 4: fFow of content design at SCORM UNP's e-learning LMS

This LO design uses MOODLE-based LMS (Learning Management System) media which is integrated into a virtual lab as a changed form of knowledge transfer through website forums and digital technology trends as a hallmark of the industrial revolution 4.0[24]. LMS MOODLE is used to make it easier for students to access LO which is integrated through the plugins available on the LMS. In addition, the use of LMS is one necessity in blended learning[25], [26]. The development of an integrated LMS with its various features can facilitate self-service and self-guided. In this study, there are also gaps in the design of flipped-book-based digital learning media or teaching materials that are integrated into a learning management system/LMS with the concept of gamification.

5. CONCLUSION

Based on some results of previous studies, the researcher saw that there were still deficiencies in the digital LO that had been developed previously. The previous digital LO did not accommodate the existing learning styles of Basic Education Technology students. Learning styles are important in learning, especially blended learning. LMS-based integrated digital LO is needed to become a link between online and offline activities in blended learning. It has produced criteria recommendations for the development of digital-based LO in blended learning. Solutions proposed for digital-based LO with flipped type, SCORM, and interactive video.

References

1) D. Munday, "Teaching and Learning Post Pandemic.," Research-publishing. net, 2021.

2) F. Han and R. A. Ellis, "Identifying consistent patterns of quality learning discussions in blended learning," The Internet and Higher Education, vol. 40, pp. 12–19, 2019.

3) S. Lonn and S. D. Teasley, "Saving time or innovating practice: Investigating perceptions and uses of Learning Management Systems," Computers & education, vol. 53, no. 3, pp. 686–694, 2009.

4) L. Wang, Y. Huang, and M. Omar, "Analysis of blended learning model application using text mining method," International Journal of Emerging Technologies in Learning (iJET), vol. 16, no. 1, pp. 172–187, 2021.

5) J. Judrups, "Analysis of knowledge management and e-learning integration models," Procedia Computer Science, vol. 43, pp. 154–162, 2015.

6) N. Cavus, H. Uzunboylu, and D. Ibrahim, "Assessing the success rate of students using a learning management system together with a collaborative tool in web-based teaching of programming languages," Journal of educational computing research, vol. 36, no. 3, pp. 301–321, 2007.

7) A. Bentri and U. Rahmi, "The Validation of Instruments for Blended Learning Assessment," International Journal of Creative Research Thoughts (IJCRT), vol. 8, no. 2, pp. 313–315, 2020.

8) E. Ningrum, "Membangun sinergi pendidikan akademik (S1) dan pendidikan profesi guru (PPG)," Jurnal Geografi Gea, vol. 12, no. 2, 2016.

9) A. Azrul and U. Rahmi, "Pengembangan Konten E-Learning Untuk Meningkatkan Pembelajaran Bermakna di Sekolah Sekolah Menengah," Jurnal Bahana Manajemen Pendidikan, vol. 10, no. 2, pp. 154–161, 2021.

10) O. Dakhi, J. JAMA, and D. IRFAN, "Blended learning: a 21st century learning model at college," International Journal Of Multi Science, vol. 1, no. 08, pp. 50–65, 2020.

11) M. Ally, "Competency profile of the digital and online teacher in future education," International Review of Research in Open and Distributed Learning, vol. 20, no. 2, 2019.

12) G. Dudeney and N. Hockly, "Literacies, technology and language teaching," in The Routledge handbook of language learning and technology, Routledge, 2016, pp. 141–152.

13) R. B. Trelease, "From chalkboard, slides, and paper to e-learning: How computing technologies have transformed anatomical sciences education," Anatomical sciences education, vol. 9, no. 6, pp. 583–602, 2016.

14) F. Van Acker, H. Van Buuren, K. Kreijns, and M. Vermeulen, "Why teachers use digital learning materials: The role of self-efficacy, subjective norm and attitude," Education and Information Technologies, vol. 18, pp. 495–514, 2013.

15) V. Sebastian, "Ensuring learning in slow learners," Educational Quest-An International Journal of Education and Applied Social Sciences, vol. 7, no. 2, pp. 125–131, 2016.

16) R. A. Rasheed, A. Kamsin, and N. A. Abdullah, "Challenges in the online component of blended learning: A systematic review," Computers & Education, vol. 144, p. 103701, 2020.

17) J. Bersin, The Blended Learning Book. San Francisco: John Wiley & Sons, Inc., 2004.

18) S. Keskin, "Factors affecting students' preferences for online and blended learning: Motivational vs. cognitive," European Journal of Open, Distance and E-Learning (EURODL), vol. 22, no. 2, pp. 72–86, 2019.

19) G. Pisoni, "Strategies for pan-european implementation of blended learning for innovation and entrepreneurship (i&e) education," Education Sciences, vol. 9, no. 2, p. 124, 2019.

20) S.-R. R. López, M.-T. G. Ramírez, and I.-S. R. Rodríguez, "Evaluation of the implementation of a learning object developed with h5p technology," Vivat Academia, vol. 24, no. 154, pp. 1–23, 2021.

21) M. Ally, "Designing effective learning objects," in Online education using learning objects, Routledge, 2012, pp. 87–97.

22) J. van den Akker, R. M. Branch, K. Gustafson, N. Nieveen, and T. Plomp, Design approaches and tools in education and training. Springer Science & Business Media, 2012.

23) U. Rahmi, "Desain Sistem Pembelajaran Blended Learning: Upaya Peningkatan Kualitas Pendidikan di Indonesia," INSGHT, vol. 1, no. 1, pp. 122–137, 2016.

24) G. Basilaia and D. Kvavadze, "Transition to online education in schools during a SARS-CoV-2 coronavirus (COVID-19) pandemic in Georgia.," Pedagogical Research, vol. 5, no. 4, 2020.

25) U. Rahmi, A. Azrul, and R. D. Mahande, "The Prototype of Blended Learning's Support System to Improve the Pre-Service Teacher's Digital Literacy," The Journal of Educators Online, vol. 19, no. 3, 2022, doi: https://doi.org/10.9743/JEO.2022.19.3.5.

26) U. Rahmi, A. Azrul, and R. D. Mahande, "The Prototype of Blended Learning's Support System to Improve the Pre-Service Teacher's Digital Literacy," The Journal of Educators Online, vol. 19, no. 3, 2022, doi: https://doi.org/10.9743/JEO.2022.19.3.5.