



RD&D Literature Review for Development of a Digital Platform for the Learning Supervision Evaluation Model (MESp)

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Article history	Abstract
Submission : 2021-09-24	This article discusses the RD&D stages that will be used to develop the MESp digital platform. This RD&D stage is done in stages and cyclically. Each phase was evaluated with the hope that it a valid, practical, and effective. The product will be produced and has been tested. The development of the MESp digital platform uses the RD&D method, using the literature review method. The RD&D phases consist of Research (Analysis, Define), Development (Design, Demonstration, Development), Diffusion (Delivery, Diffusion, Adoption). Each phase is equipped with sub-activities that must be done. Each phase evaluates PAI (Purpose, Activities, Interim Product). Users are allowed to move to the next phase when an evaluation has been produced that can answer. The achievement of its objectives, the activities that have been done, and the temporary products produced. Users are given the freedom to add sub-activities from each phase, if necessary and for an apparent reason.
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1. INTRODUCTION

Research and development (R&D) is a research method used to develop new products, improve or modify existing products. According to Richey & Klein (2007), R&D is used for (1) product and tool research; and (2) research to produce a model. Product development aims to get better quality (Richey, 1997:92); and expand development and validation (Richey, 2005; Maina, 2012). The final goal is for various benefits, needs, and demands for human life. The hope is that it will be more effective, faster, more practical, more efficient, easier to use, etc. R&D activities will produce a product and arrange methodological guidelines for product design and evaluation (Akker & Plomp, 1993: 1-8). The development process requires time and stages of activities that are carried out in stages, systematically, scientifically, and can be accounted for.

In the human life journey in this world, without realizing it, they have applied Research and Development (R&D) research methods. It can be seen that many products have been passed down from generation to generation by our ancestors. Over time, after research by experts, it turns out that scientifically, it positively impacts human life. Products inherited from the past are not necessarily

recognized for their quality and benefits. Recognition was given after several trials, which finally found good and usable ingredients/products. It is unfortunate that the trials conducted by our ancestors were undocumented and did not show their scientific merit because they were not based on adequate literature references (Richey & Klein, 2007).

This article developed a digital platform evaluation model for supervised learning (MESp) in this article. There are two activities developed, consisting of an evaluation model on learning supervision and a digital platform. The expected product is the MESp digital platform. The planned model was obtained by constructing adequate literature supported by the practical experience of evaluation in learning supervision, strengthening the objectives of developing an evaluation model on learning supervision, and references to several evaluation models. Considering that the era is digital, the developed learning supervision evaluation model is applied in a digital platform (Winaryati, Mardiana & Hidayat, 2020).

This MESp digital platform article was developed through a literature review method. The objectives of the literature review based on Bruce (1978) are: (1). Find important variables. (2) Distinguish what has been done from what needs to be done. (3) Synthesize the available studies to have perspective. (4) Determine the study's meaning, relevance, relationship, and deviation from the available studies. (5) The literature review provides insight into previous research's strong points and limitations, thus allowing for enhanced investigation. This reference becomes the basis for determining the R&D phases that must be carried out.

Based on the explanation above, it can be concluded that to develop a product (model), there are 2 phases. The first phase, tracing to find out the development of the previous model to design the MESp development to build on what is already known about the digital platform, the evaluation model, and the supervision of previous learning. The MSP model building that will be built provides direction on how R&D will be developed to get a valid, practical, and effective model to use. The general stages are testing the designed product, reviewing and correcting the product based on the test results, after being tested for validity, practicality, and effectiveness (Akker, 2000:3-6; Maina, 2012).

In this first phase, answer some question words: why, when, who, and how. The R&D stages used to develop the MESp digital platform must answer why research uses the R&D method to develop the MESp digital platform. At the time, the R&D stages began to be used to produce good product quality. The R&D stages play a role in how to operate each stage of R&D in order to get good products, practical and effective products.

The second phase is to build a base of ideas to be brought to the research report, compared with reality and other literature, to summarize research that contributes to knowledge development. The new research unrelated to the previous thinking and research is a missed opportunity to move knowledge forward (Bruce, 1978).

This article discusses the stages of R&D that will be used to develop the MESp digital platform. In order to strengthen the relationship between research and practice in education in the actual condition, the demands of the Research and Development (R&D) model direct the existence of projects/products that the wider society can utilize. The demand for research results is expected to be disseminated and informed, and communicated through collaborative activities. It will contribute to the development of the model through the RD&D method to be done. This RD&D stage is done in stages; each stage/phase is evaluated for effectiveness, with the hope that a good, practical, and effective product will be produced and has been tested (Roblin & McKenney, 2018).

2. METHOD

This article was developed through the Literature Review research method. "Review" means organizing knowledge regarding the specific area of research being developed and building knowledge to demonstrate that the study being reviewed will be an add-on to the field related to the MESp digital platform. "Literature" is the base on where all of the tasks will be built. Failure to build on the knowledge base provided by a literature review will result in research that tends to be shallow. The aim is to open the door to essential sources of problem-solving and comparative data to interpret results, combined with accumulated past knowledge records.

The method used is through an in-depth study of the literature related to the evaluation of learning supervision. Literature extracted from journals and open sources. The study results were validated and discussed with supervisors and colleagues (Muller, & Urbach, 2017).

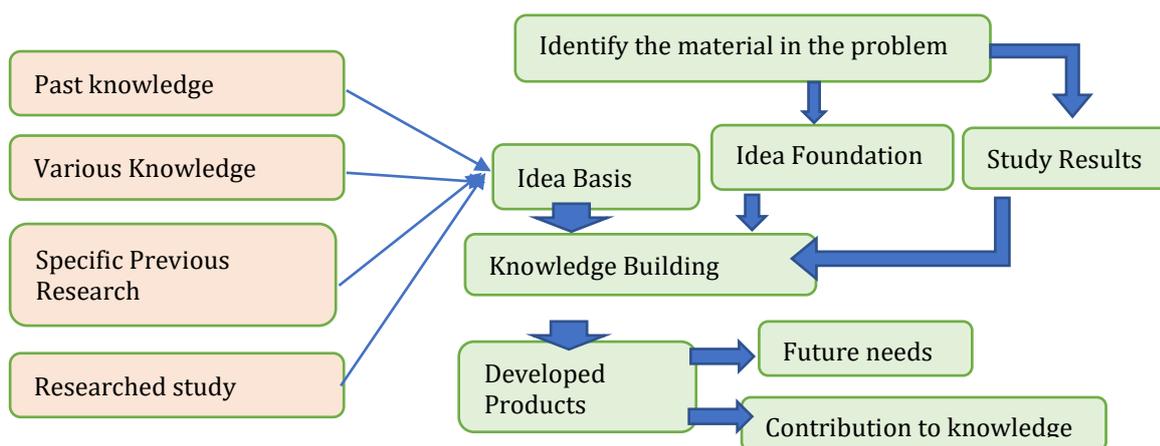


Figure 1. Product Development Flow

The literature review in this article has two phases. The first phase identifies all that is relevant to the material discussed in the problem area. The goal is to develop a foundation of ideas, and the results will be the basis of the studies examined. The second phase of the literature review involves writing a base of ideas into a part of the research report, summarizing the thoughts and research needed to understand the research as a whole. The conclusions drawn in the study can be significantly compared and used as material for research findings, thereby contributing to an accurate knowledge of the evidence or literature in the areas discussed related to the MESp digital platform.

3. RESULTS AND DISCUSSION

This article focuses on the development of the MESp digital platform with an R&D approach. The R&D phases that will be used are based on several basic R&D models that previous experts have developed. The stages of R&D implemented related to education were newly developed by Borg n Gall. This article combines Borg n Gall's R&D with several instructional designs. Based on the explanation above, it is necessary to adopt an instructional design to obtain an R&D model with detailed and systematic stages.

Instructional design or Instructional Systems Design (ISD) creates learning experiences and materials that result in the acquisition and application of knowledge and skills. Implementing a needs assessment system, designing processes, developing materials, evaluating them, testing their practicality, effectiveness, and validity (Battles, 2006; Maina, 2012).

Instructional design is the primary tool to build a systematic model/product in a learning activity. The Department of Health (2015) has developed Continuing Professional Development (CPD), which can improve professionalism, credibility, and transparency to the public by analyzing, designing, developing, implementing, and evaluating educational programs through the ADDIE model. ADDIE describes a systematic approach to instructional development, synonymous with instructional systems development. ADDIE is an instructional system design model that presents a series of iterative steps to build effective education and training in five phases: analysis, design, development, implementation, and evaluation (Molenda, 2003; Almomen et al., 2016). The 4D model design developed by Thiagarajand has produced practical and effective teaching materials for children with special needs. The design of the ADDIE model has been widely used, among others, for the development of Blogs as learning media to support CTL-based chemistry learning (contextual teaching and learning) on the concept of oxidation-reduction reactions (Sulistiyani & Nirwana, 2019). ADDIE is also used to develop teaching materials based on Islamic-Science integration on petroleum materials to implement character education (Faeha, Wahid, & Udaibah, 2019). The 5D spiral bay Cernamo, which emphasizes learning strategies, has benefited education (Cennamo & Kalk, 2018).

Based on a review of several pieces of literature, that the phases in the development of teaching materials, learning media, learning tools, presentation materials, participant guides, handouts, and work aids, curriculum development, and other materials have similarities with the phases of the R&D method, (Akker, 2007, Pieters et al. (eds.)). The explanation above shows that product development results through instructional design have produced valid, practical, and effective improvements in learning (Alias & <https://jurnal.unimus.ac.id/index.php/JPKIMIA/index>

Hashim, 2012). The above explanation becomes very appropriate when the instructional design phases are adopted into R&D phases.

Research and development consist of two words, namely research and development. The research comes from the terms re and search, which means looking back constantly repeated. Development is development through trials. This article is based on several steps :

1. We are expanding the meaning of Research and Development (based on the Borg n Gall R&D model with the RD&D model developed by Havelock).
2. Define RD&D stages (based on the ADDIE instructional design model, 5D spiral models Cennamo, RD&D Havelock models, and 4D Thiagarajan models)
3. Define the flow of the RD&D model (based on the ADDIE instructional design model)
4. Determine the implementation of evaluation for each stage of RD&D (based on the spiral models of Cennamo)

Briefly described the flow of literature review from the development of digital platforms MESp as follows:

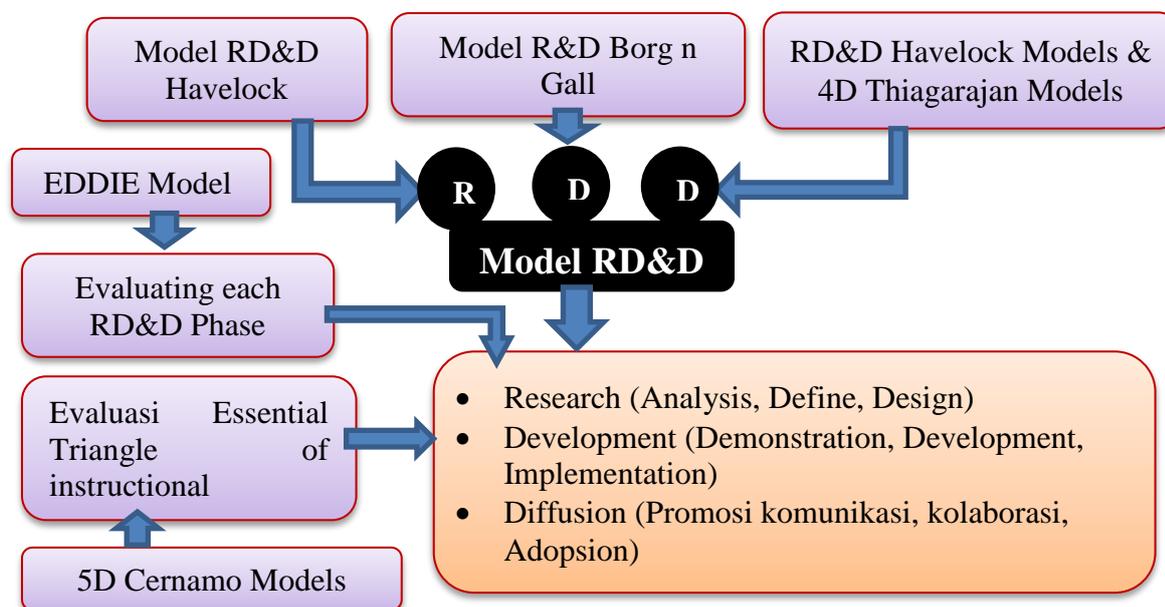


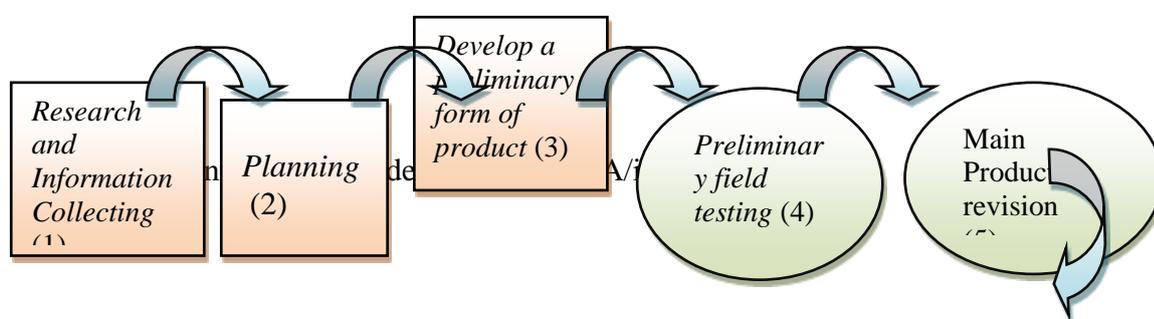
Figure 2. MSP Digital Platform Literature Review Flow.

RD&D above is described in stages with the following description as follows:

1. Expanding the meaning of Research and Development

The R&D developed by Borg and Gall is based on a more robust development stage. The research is based on research and information collecting activities with two main activities: literature study (library review and previous research results) and field study. RD&D developed by Havelock describes his very in-depth research emphasis through activities: *Basic Scientific, Inquiry, Investigate Problem, Gather Data* (Havelock, 1976:10-28).

In order to increase the quality of the R&D method, The R&D adopted the research phase of the RD&D Havelock model (1976: 10-28). The aim is to increase the weight of research in R&D to make it more entrenched. Because preliminary investigation and analysis only indicate that lack of the research weight. The development of R&D refers to the strengths of the R&D model developed by Borg n Gall. The following are the ten steps of Borg & Gall's (1983: 772) R&D R&D, as a whole, they are as follows:



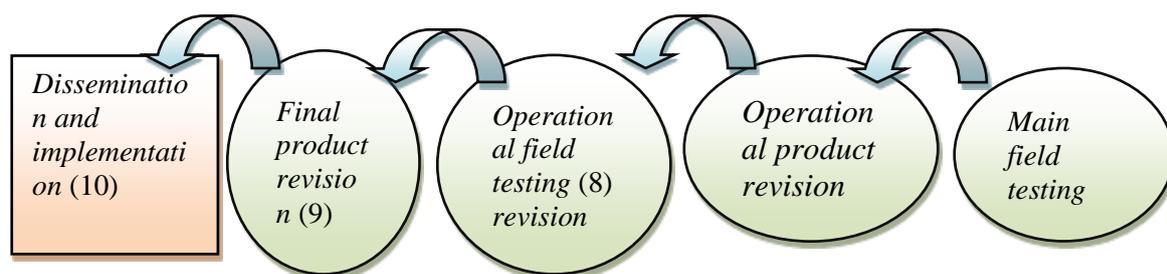


Figure 3. Borg & Gall's R&D Steps

Based on the 10 (ten) steps of Borg & Gall's R&D, the weight/portion of the development is much than that of research. Borg & Gall's R&D development phase is in stages 4 to 9, with several trials starting with the number of schools (1-3 schools), 5-15 schools with 30-100 subjects, and 10-30 schools with 40 - 200 subjects. Based on the study that the development stage at Borg & Gall's R&D is broader than others. The results of R&D activities will be even better when repeated trials are done with many subjects. Havelock's RD&D stages have the following implementation description as follows:

<i>School of Research</i>	<i>Stages in Research</i>	<i>Stages in Development</i>	<i>Stages in Diffusion and Adoption</i>
<i>Research Development & Diffusion (RD&D)</i>	<u>RESEARCH</u> <i>Basic Scientific; Inquiry; Investigate Problem; Gather Data</i>	<u>DEVELOPMENT</u> <i>Invent & Design Engineer & Package Test & Evaluate</i>	<u>DIFFUSION</u> <i>Promote Service Inform Nurture Demonstrate Train Help</i> <u>ADOPTION</u> <i>Awareness Interest Evaluation Installation Adoption Institutionalization</i>

Figure 4. Havelock RD&D Steps (Havelock, 1976).

Based on the above picture, Havelock developed Research, Development, and Diffusion, abbreviated as RD&D. The activity of diffusion and adoption according to Havelock is strengthened by Thiagarajan, Semmel & Semmel (1974). Diffusion is a demand so that research findings can spread benefits and be accessed by parties in need through various translation and dissemination efforts (Pieters et al., 2019). This study explores how the relationship between research and practice can be realized from product development to be informed. It provides an understanding of the need to facilitate diffusion and adoption in research and development and will be a characteristic of the RD&D model (Roblin & McKenney, 2018).

Sivasailam Thiagarajan, Semmel & Semmel (1974) developed a 4D model design, which was used to develop learning tools for teacher training for children with special needs. More detail is the development of teaching materials for children with disabilities. The idea for this development stemmed from finding problems with the capacity of the three of them who worked at the Center for Innovation in Training the Handicapped at Indiana University (Indiana University). Three of them analyzed the fundamental problems faced by teacher training participants for children with special needs to improve their performance so that they could be recorded and considered efficient learning alternatives, namely the development of learning materials.

2. Establishing the RD&D Phase

Based on the combination of Design instructional ADDIE (1982:1-8) and 5D spiral models developed by Cennamo & Kalk (2005:6), they were combined with the RD&D model by Havelock (1976: 10-28) and R&D by Borg & Gall (1983: 772). Overall, three stages of RD&D were produced, and the details of the stages through 7 (seven) steps. The modification process is as follows:

- a. It produced three stages, namely: Research, Development, and Diffusion, based on the RD&D stages of Havelock with the Borg n Gall R&D model.
- b. Generated phase details of each RD&D stage, based on a combination of Design instructional ADDIE and spiral models Cennamo, Design instructional ADDIE and 5D spiral models Cernamo, and 4D models Thiagarajan.

The objectives of this R&D modification are 1) to produce a model that can facilitate the implementation by the user; 2) obtain a more detailed, systematic, and complete R&D stage; 3) more comprehensive R&D activities; 4) proportional research weight in R&D; 5) Extensive development measures; 6) the existence of research activities done in the area of practice in the field; 7) there is clarity of activity from each phase. The combination of the stages of RD&D developed is described. The steps of the modification process are as follows:

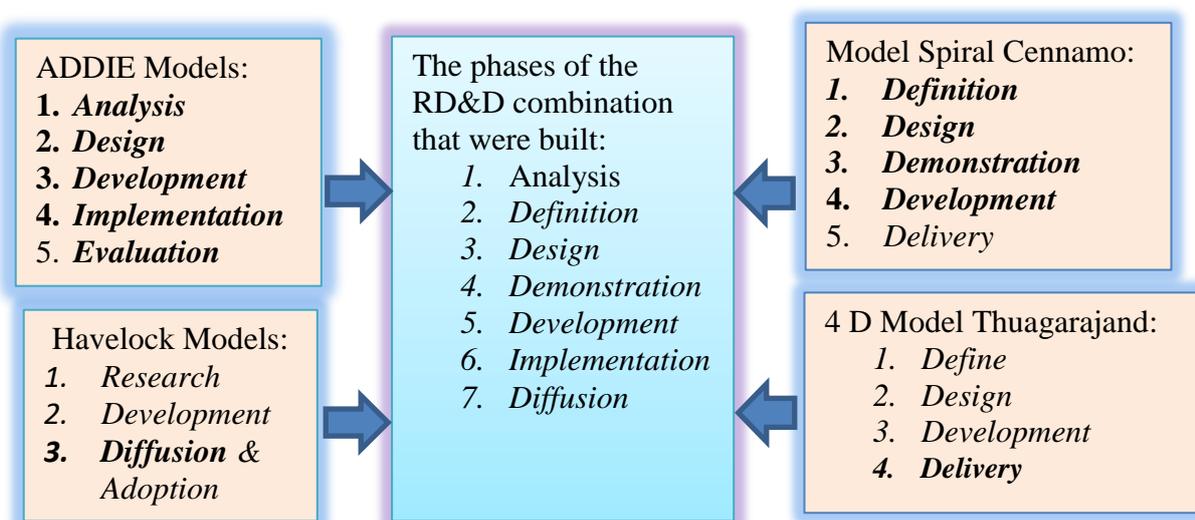
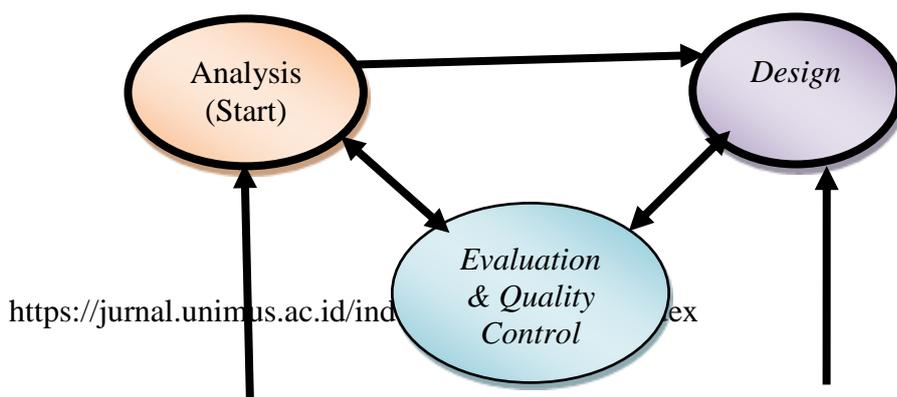


Figure 6. The phases of the RD&D combination that were built

The ADDIE model and the 5 D model of Cennamo & Kalk are described as follows:

Model ADDIE (*Analysis, Design, Development, Implementation, Evaluation*). The five stages are a guide for designers to create effective learning and obtain optimal results. Almost all classical models of instructional design are variations of the ADDIE model.

The explanations of the ADDIE model are: (1) The Analysis phase includes: needs assessment, identification of goals and students, assignments, context, goals, and skills analysis. (2) The design phase (Design phase) includes the development of objectives, test items, and learning strategies. (3) The development phase, which includes the preparation of teaching materials. (4) Implementation phase includes activities to support the delivery of instructions. (5) The evaluation phase includes formative and summative evaluations. They are schematically illustrated in Figure 9 as follows.



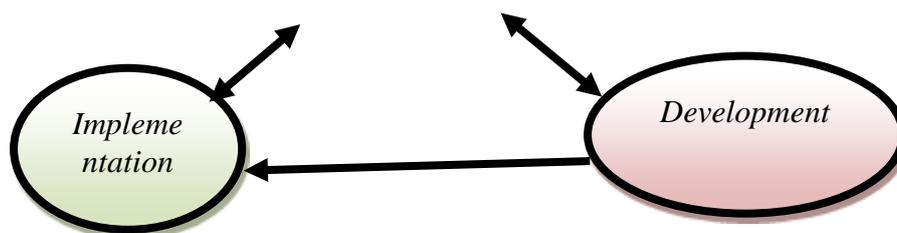


Figure 6 *Instructional System Design*

5D Spiral Models Developed by Cennamo & Kalk

Cennamo & Kalk designed a 5D spiral model starting at the center, namely the definition phase, and moving outward through the other phases to understand each element in each phase better. Spiral understanding is, moving to the subsequent phases, required to make decisions quickly, bringing with it greater understanding each time it moves to the outer layers of the spiral. Designers need to collaborate to create a learning system that includes clients, teams of experts, instructors, and students, to refine the essential elements of the designed instruction system.

Each phase combines the essential elements of systematically designed instruction, including learner needs and characteristics, desired learning outcomes, assessment, learning activities, and evaluation. Cycle through the stages of Definition, Design, Demonstration, Development, and Delivery, which are essential elements of the design of this model.

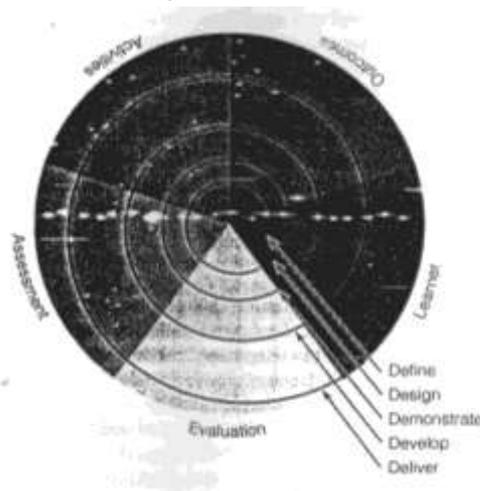


Figure 7 Five phases of Instructional Design In this Spiral Model

The above combination resulted in the following phase details:

Table 1. Description of 7 (seven) Research Steps for MESp Digital Platform Development

I. Research Stage (RESEARCH)	
1)	ANALYSIS PHASE: <i>Basic Scientific, Inquiry, Investigate Problem, Gather Data.</i> Initial research activity to describe the MEP's digital platform model. Details of its activities include a. needs analysis; b. characteristics of users, namely teachers and KS; c. identification of goals; d. Analysis of the evaluation model to be used, e. learning supervision analysis; f. Analyzing the prior knowledge that must be prepared regarding the planned model
2)	DEFINE PHASE. Determine development plans and directions (<i>definition</i>). Determine the scope of activities, outcomes, schedule, and possibilities for their presentation. The activities done are, Information on model planning that needs to be developed, How to deliver model products to users, and Readiness in terms of learning supervision, which needs to be considered; d. Set benchmarks for potential success (assessment). e. Determine product proposals; f. They are planning a strategy to determine the practicality, effectiveness, and validity of the MESp digital platform model.

II. Development Stage (DEVELOPMENT)	
3)	DESIGN PHASE. It was making or designing a design, including outlining the plans that would produce the product. This phase produces proposed development activities in a. Take all the information from the analysis and definition stage; b. Identify sub-skills; c. Identify model strategies and implications for activities; d. We are planning for prototype testing and formative evaluation, e. The final result of the design stage is a blueprint or storyboard for the MESp digital platform.
4)	DEMONSTRATION PHASE. The activity is to collect content from experts and available media sources. Conclude information into production documents and prototypes. We are checking the validity of product specifications and various prototypes with teachers, principals, stakeholders.
5)	DEVELOPMENT. Doing development. The activities consist of: The main activities in this phase are related to the individual trial phase, limited trial, main field trial, and operational field test. Each trial activity is always accompanied by evaluation and revision until a final production model is produced, namely: the MESp Digital Platform model.
III. Deployment and Usage Stage (DIFFUSION)	
6)	IMPLEMENTATION PHASE. The stages of the activities are as follows: a). Implementing the model in the field; b). It is necessary to ensure that all products can run as they should; c) evaluate from the planning stage; d). measurement of model quality. Activities can be done through training, experimental approaches, and collaborative learning.
7)	DIFFUSION PHASE. Tahapan kegiatan ini adalah sebagai berikut: a). Fase ini menghasilkan kesimpulan keberhasilan dari proyek desain melalui evaluasi; b). membuat rekomendasi untuk development masa depan.; c) menyajikan produk ke klien; d) menyebarkan model; e) melakukan negosiasi untuk mendapatkan kebijakan penyebaran.

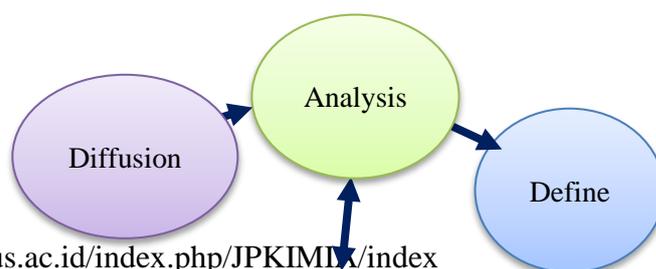
3. Define RD&D model flow

The determination of the model flow is based on the ADDIE instructional design model (Analysis, Design, Development, Implementation, Evaluation). The five phases are a guide for designers to create effective learning and obtain optimal results. The final result of this stage is an evaluation and revision report from each phase. It is to be used as a reference for revising each phase and overall feedback.

An illustration of the ADDIE model is depicted in Figure 9 below. The illustration shows that the results of each phase are evaluated before moving on to the next phase. Instructional design is a dynamic process that can change according to information and evaluations received. All changes made have one goal, namely to improve student learning outcomes.

The model description from ADDIE becomes the basis for the cycle concept of the RD&D model that is used to develop the MESp digital platform with cyclical RD&D or the circular model of RD&D (Winaryati, 2011).

The method used in developing the MESp digital platform is the RD&D (Research, Development, and Diffusion) method. The RD&D (Research, Development, and Diffusion) method goes through the following stages: (1) Research (analysis and define); (2) Development (design, demonstration, development); (3) Diffusion (implementation and diffusion). The evaluation phase of the ADDIE process provides feedback that can lead to product improvement of the MESp digital platform.



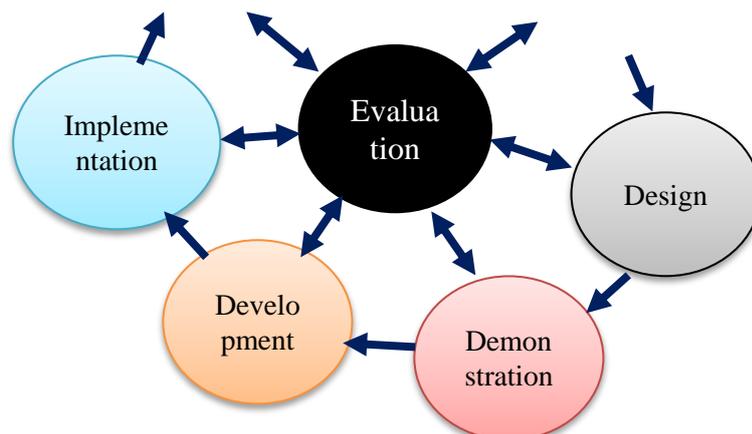


Figure 8. Stages of RD&D

4. Determine the implementation of evaluation in each phase of RD&D

Determination of the evaluation implementation at each phase of RD&D is based on the Cernamo spiral models. The five phases of Cernamo's 5D spiral model consider five essential elements: learners, outcomes, assessments, activities, and evaluations. Each phase considers essential elements, keeping them in the ASC cycle (Assemble and ask, Synthesize and solve, check and confirm). This cycle includes: gathering information and questions, synthesizing information and solving problems, checking to understand and strengthen it.

The relationship between the essential elements of the design can be described as an equilateral triangle (figure 12). Outcomes, activities, and assessments are placed in each of the three corners to illustrate that each element must be balanced or that there is alignment to achieve the desired effective instruction. These elements support the critical element, namely the learners (learners), in the middle of the triangle. Evaluation wraps all elements in a triangle. Evaluation provides feedback on program effectiveness and helps designers determine if any adjustments/improvements are needed.

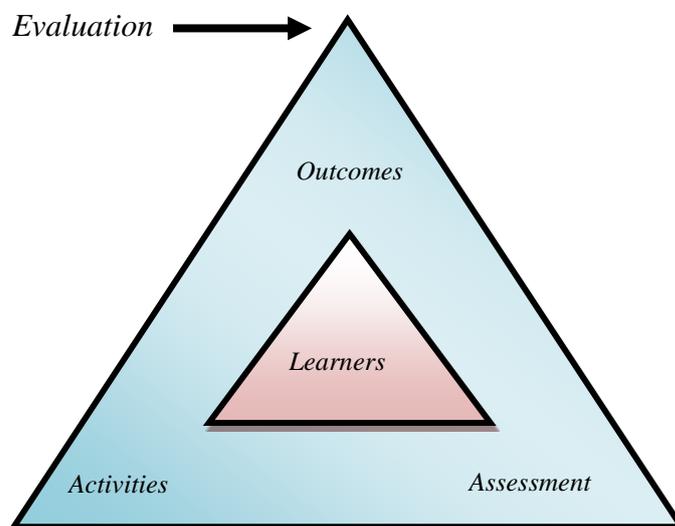


Figure 9 Essential Triangle of Instructional

The five elements interact with each other to create the achievement of predetermined systematic instructions. A system is "a set of interrelated parts, all of which work together towards a defined goal" (Dick & Carey, 2005: 2-3). Each element works toward a common goal, including results, assessments, and activities, which all interact to meet the learner's needs. In an instructional design system, evaluation determines whether it has worked as intended. Testing the program with different students will determine whether the program will provide practical teaching for students. If the following evaluation results show that this system no longer meets the needs of students, then it is tested again until it meets the objectives.

Throughout the entire process, constantly collaborate with various "stakeholders," or individuals interested in the finished product. ASC's collaborative cycle always ensures that it constantly seeks information from others to design, develop, and revise products. Get feedback from various stakeholders to improve the product resulting from the design process. When it is designed and will be disseminated, it must meet three criteria as follows:

- 1) Reflecting the harmony between results, activities, and assessments.
- 2) It has been designed with the characteristics and needs.
- 3) Experiencing evaluation and revision based on response.

An explanation related to the essential triangle of instructional learning includes evaluation activities on the balance of outcomes, activities, and assessments resulting from learning process activities to meet the needs of learners. This article reinforces so that each RD&D phase is assessed for its achievement through evaluation. Based on the explanation above, it is necessary to evaluate each phase. The evaluation results provide direction, whether it has been met or needs improvement, before moving on to the next phase. Evaluation of each RD&D phase includes the achievement of objectives, activities carried out, and products produced.

The evaluation used is called PAI (Purpose, Activities, Interim Product), having previously prepared the instrument used to assess. Each activity from PAI answers: what, why, when, and how. Achievement of objectives includes: what is the purpose of each phase? What are the goal indicators for each phase?. When was that goal achieved? How to achieve it? Activity achievement includes: what is meant by activity in each phase? What must forms of activity be carried out from each phase? When was the activity carried out? How to do this form of activity? Evaluation of PAI (Purpose, Activities, Interim Product) is described below.

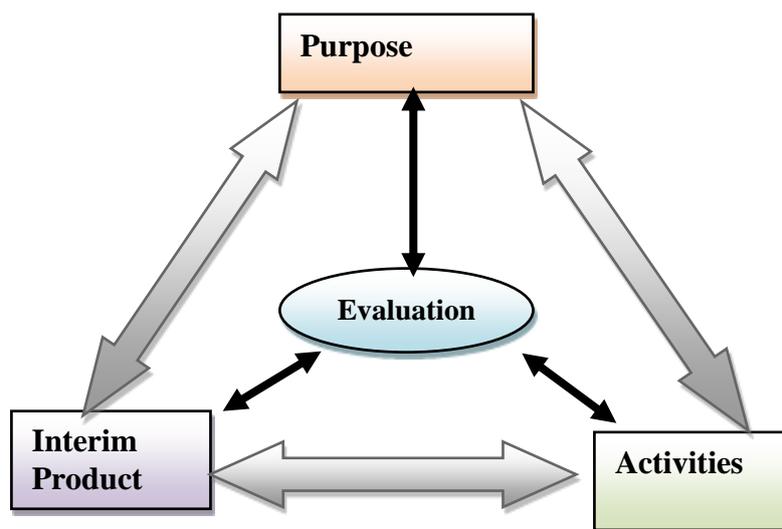


Figure 10. PAI Evaluation (Purpose, Activities, Interim Product).

Why choose the Circular Model of RD&D?

The RD&D phases are detailed with a complete phase sequence. The aims are: first so that the user understands the detailed activities that must be done in each phase. If the user conducting RD&D only uses several phases, there must be an apparent reason and understanding of why and how it should work. This reason must be given when not fully implementing the phases.

The second aim of activity tools that must be carried out is that each phase has transparent activities, detailed, coherent, and systematic. Users are given the freedom to add sub-activities from each phase if necessary. The third aim, the user to understand that the research process is cyclic, rotating continuously. One research that has been done encourages users to develop or improve the results obtained in the subsequent research. Research work is very dynamic and progressive and very possible to be developed by others. The fourth aim is for the user to understand that each phase must be completed before moving to the next phase. Evaluation tools are used to assess whether a phase has been completed, and the results need to be followed up in the next phase. The fifth goal, there needs to be a tool for users to evaluate with evaluation tools that include the achievement of goals, the existence of explicit activities

that have been done, and the existence of temporary products towards the completion of the following temporary product. Temporary meaning is the essence of circular research (continuously rotating).

4. CONCLUSION

The development of the MESp digital platform uses the Research, Development, and Diffusion (RD&D) method based on previous research experiences, related references, and future demands. The RD&D phases consist of Research (Analysis, Define), Development (Design, Demonstration, Development), Diffusion (Delivery, Diffusion, Adoption). Each phase is equipped with sub-activities that must be carried out. Each phase evaluates PAI (Purpose, Activities, Interim Product). Users are allowed to move to the next phase when an evaluation has been produced. The achievement of its objectives, the activities that have been done, and the temporary products produced. Users are given the freedom to add sub-activities from each phase if they feel it is needed and there is an apparent reason.

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