Research Article

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Brain-Based Online Learning Design in The Disruptive Era for Students in University

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Abstract

The learning model is a collection of activities that occur during the teaching and learning process with the objective of achieving the set goals. The brain-based online learning model developed is a solution to the students' learning problems. The majority of students struggle to interpret all of the learning materials they receive. This resulted in students' dissatisfaction with the learning materials. The purpose of this research is to develop a brain-based online learning process design based on the aforementioned problems. The Lee & Owens model of development was used in this development research. The stages of the Lee & Owens development model are analysis, design, development, implementation, and evaluation. The development research findings are as follows: (1) the media experts' assessment, which resulted in an 89.35% score with a valid category. (2) The assessment of the developed learning materials by material experts resulted in a score of 91.23% with a valid category. (3) expert evaluation, with an overall score of 86.35% for having a valid category. (4) The results of individual trials produced a percentage score of 88.5% with a valid category. (5) The results of small group trials indicated an overall percentage score of 81.60% of valid categories. (6) Field trials are classified as valid when they receive a percentage of 79.89%. The results of the development indicate that the brain-based online learning design is feasible for use.

Keywords: *Brain-Based Online Learning, Disruptive Era, University*

1. Introduction

At the moment, the world is experiencing a disruptive era. The disruptive era is a time period during which numerous innovations are not visible, are not implemented by established organizations, agencies, companies, or institutions, and thus disrupt the operation of the existing system's order and have the potential to destroy it. Learning is the process of altering one's behavior in order to acquire new skills, abilities, and something new that is directed toward a specific goal. Additionally, learning is a process of doing something through various experiences such as seeing, observing, and comprehending something. Learning is an excellent way to enhance an institution's capacity for

imparting knowledge to students (Lapada et al., 2020).

The era of disruption is inextricably linked to the state of increasingly sophisticated digital technology, to the point where students born in the digital era have a very different culture than their parents. Students live in a world where access to information is easier, the network is more global, and lecturers as educators can't rule out two-way communication. The incorporation of digital instruments into the educational process has had a significant impact on both lecturers and students' approaches to learning (Morze et al., 2021). Students of this generation are accustomed to interacting with one another via social media platforms and do not view one another as senior or junior. Since the advent of online education, numerous educational institutions across the country have incorporated the internet into their teaching and learning processes (Itmeizeh & Farrah, 2021). Data-driven analysis of the implementation of online learning can assist policymakers (schools, government) in streamlining decision-making processes, optimizing resource allocation, monitoring and assisting students experiencing difficulties while online learning, and modifying pedagogical modes and learning methods (Wahyuni et al., 2021). Additionally, in this disruptive era, numerous new innovations have emerged as a result of more capable technology, as many people can obtain information and access knowledge resources without attending a class.

The learning design course is critical for students of Educational Technology at the State University of Surabaya. Courses in learning design lay the groundwork for students to develop their ability to learn in the classroom. Students continue to struggle with the subject of learning design, as evidenced by their inability to explain it, both in terms of its definition and application in the classroom. These issues must be addressed in order for students to master learning design. When mobile learning products are incorporated into the learning process, the integration of learning becomes more complex and realistic (Hendarwati et al., 2021). Learning in a complex sense is a conscious effort from a teacher to teach his students (directing student interaction with other sources) in order to achieve the expected goals. (Hirananda Dimas Pradana & Arthana, 2015).

In the course of learning design, it is necessary to create a learning design that enables students to interpret all of the lecturer's learning materials. Meaningful learning has the potential to leave an indelible impression on students. This is the opportunity for students to make learning materials memorable and well-understood. The learning system's design process encompasses the following steps: analysis of teaching-learning needs and learning objectives; and development of instructional systems that address these needs (Moradmand et al., 2014).

Brain-based learning is a comprehensive approach to instruction that is based on current neuroscience research about how our brains naturally learn. Brain-based Learning Model is a type of learning model that enables students to learn naturally by facilitating brain performance (Widiana et al., 2017). This theory is based on our current understanding of the structure and function of the human brain at various developmental stages. Students are the primary subject of the learning process; they engage in a variety of activities in order to achieve the best result. (Kartikaningtyas et al., 2018). A lecturer who approaches learning from this perspective will consider how to identify students' inherent difficulties and develop motivation in such a way that the desired behavior emerges as a natural consequence (Jensen, 2011).

The stages of brain-based learning that are disclosed (Jensen, 2011) The stages are as follows: pre-exposure, preparation, initiation and acquisition, elaboration, incubation and memory entry, belief verification and validation, and celebration and integration. Referring to the educational constructivism concept, student success is determined by their ability to construct knowledge and understanding of a subject matter through their own learning experiences, where learning is a series of simple processes that students must perform and experience for themselves in order to construct knowledge and the meaning of learning that they will later acquire.

Academic achievement tests indicate that brain-based learning has a significant effect on students' academic achievement. As a result, it can be concluded that brain-based learning results in greater achievement and retention. Students' attitudes and motivation toward chemistry can be improved through brain-based learning. It explains clearly that when learners are taught through

meaningful and active practical activities coupled with appropriate innovative learning in critical thinking and problem solving skills, they feel more at ease, confident, and motivated in the classroom, which can help them achieve success in their academic endeavors (Uzezi & Jonah, 2017)

Based on the results of other studies, there is an interaction of learning models on mathematical communication skills in terms of creativity, mathematical communication skills given the treatment of the Brain Based Learning model are higher than students who are given the expository model treatment on students who have high creativity (Adiansha et al., 2018). Learning in a complex sense is a conscious effort from a teacher to teach his students (directing student interaction with other sources) in order to achieve the expected goals (Pradana, 2015:4).

The learning process is a communication process, that is, it is the process of delivering messages from the source of the message to the recipient of the message via specific channels / media. The communist process is composed of four components: message, message source, channel / media, and message recipient. The process that is communicated is the preparation and use of subject matter in learning. Learning materials are items that the teacher must prepare prior to conducting instruction (Siagan, 2019). The message's source can be students, other people, or book authors, or even the media itself.

Not only lecturers are required to be active participants in the learning process; students are only required to be passive recipients and listeners of the material presented. Active participation in learning is required of both parties who are the subject of the learning. Thus, if learning is defined by the lecturer's active participation while the students remain passive, the activity is essentially called learning. Similarly, if learning consists solely of student activity without the lecturer's active participation in managing it properly and in a directed manner, it is simply called learning. This demonstrates that learning requires both lecturers and students to be active participants. Numerous learning models and methods are available for use in education. Effective learning is one that stimulates all students' potential for thought. Alternatively, effective learning is defined as the ability of students' right and left brains to work in harmony (Lestari et al., 2019)

Brain-Based Learning strategies resulted in student success, which resulted in a favorable student perception. Additionally, the Brain-Based Learning strategy addresses the perceptions of various learners, eradicating their negative perceptions and low expectancy (Uzezi & Jonah, 2017). Brain based learning is an engagement strategy based on principles derived from an understanding of the brain (Jensen, 2011:5). Brain-Based Learning can be thought of as techniques gleaned from neurology and cognitive science research that are used to improve teacher instruction. Additionally, these strategies can be used to strengthen students' ability to learn in ways that are most comfortable for them neurologically (Connell, 2009). According to Connel's opinion, teacher instruction is improved through the use of brain-based learning as a technique derived from research in the fields of neurology and cognitive science. Additionally, brain-based learning can be used to enhance students' ability to learn in ways that are most comfortable for them, neurobiologically speaking.

From these perspectives, it can be concluded that the brain-based learning model is about optimizing students' potential by paying attention to how the brain works, which is naturally designed for learning. This brain-based learning is designed with the benefit of the brain in mind, specifically by creating a positive and enjoyable learning environment that enhances the learning experience. Jensen(2011) revealed that "while all learning involves our body, mind, attitude, and physical health, brain-based learning takes a more frequent and comprehensive look at these multiple variables".

According Jensen (2011), the outline of learning planning based on brain-based learning, the following seven stages are involved:

a. Pra-exposure: This phase provides the brain with a review of the new information before delving deeper and assisting the brain in developing a more accurate conceptual map. Pre-exposure aids the brain in developing a more accurate conceptual map.
b. Preparation: During this phase, the teacher piques students' interest in or enjoyment of the material being taught.

c. Initiation and Acquisition: This phase assists students in acquiring knowledge.
d. Elaboration: This is the phase in which information is processed. Requires the learner to demonstrate pure thinking abilities.
e. Incubation and Memory Encoding: This phase emphasizes the value of rest and replay time.
f. Verification and Confidence Checking: This phase is not just for teachers' benefit; lecturers must also confirm their own learning.
g. Celebration and Integration: This stage is critical for effectively engaging students' emotions. This phase instills the value of a lifelong love of learning. Teachers have the opportunity to make this phase exciting, cheerful, and enjoyable.

2. Methods

The Lee &Owens development model was used in this development research. Developers perform five stages in the Lee & Owens development model. Lee & Owens present five stages: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation.

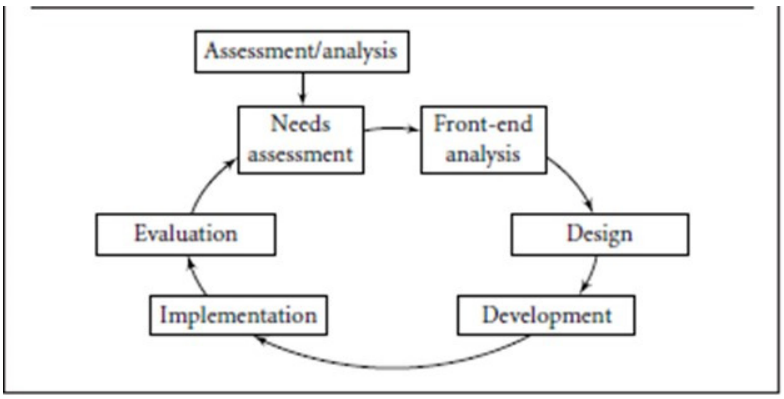

Figure 1. Lee & Owens Development Model

Lee & Owens is extremely simple to implement. Additionally, everyone is familiar with the stages. This Lee & Owens development model was chosen by the developer because:

1. The flow of the development model put forward by Lee &Owens can be applied quite easily.
2. Lee &Owens development model is specifically designed to design multimedia-assisted learning. Therefore, this development model is appropriate when used by developers to develop adaptive learning material
3. Lee &Owens development model has a needs analysis component and front – end analysis. Need Assessment and front - end analysis have an important role in developing a product.

Lee &Owens development model has 5 stages performed by developers. The five stages put forward by Lee &Owens are:

1. Stage of analysis
   There are two parts, namely need assessment and front– end Analysis).
   a. Need Assessment.
      Need assessment is used to determine the difference between actual and desired conditions and to prioritize the actions taken. The purpose of this development study's need assessment is to examine and analyze the gap between the current state and the ideal state. There are numerous instructional design models that can be applied to the creation of educational media. However, in general, the first step in developing

educational media is to assess the needs of (Tambunan, 2021)

b. Front – End Analysis.
Front-end analysis is a data collection technique that is used to bridge the divide between current and ideal conditions for problem solving – the ones that exist.

2. Stage of design
The design stage is the stage in which the product creation project is planned. Planning is a critical step in the creation of a product. At this point, the development of storyboards and flowcharts is underway (Nuryadi et al., 2020). The majority of products fail to be manufactured due to an immature planning process that is not prepared to continue but is compelled to continue. (Hirnanda Dimas Pradana & Kuswandi, 2018).
3. Stage of development
The design stage is the stage in which the product creation project is planned. The development stage is the process of turning a blue print or product design into a reality (Pujiastuti & Haryadi, 2019). Planning is a critical step in the creation of a product. The majority of products fail to be manufactured due to an immature planning process that is not prepared to continue but is compelled to continue. (Aldoobie, 2015)
4. Stage of implementation
At this stage, the developer implements the developed instructional materials. At this stage, the developer organizes all of the components required to implement the developed materials. At this stage, the developer's products have been reviewed by experts. The activities carried out on the action implementation stage are the planning and implementation of previous research conducted during the stage (Widayanti, 2019). At this point, the product is ready for testing. The implementation stage is a concrete step toward implementing the created learning products (Budiarta, 2014).
5. Stage of evaluation
The final stage is to conduct an evaluation, the results of which will indicate whether the media is valid or invalid. (Gusmida & Islami, 2017). This stage-by-stage evaluation developed by Lee & Owens consists of two components: formative and summative evaluation. Developers evaluate only up to the formative evaluation stage in this development. Field trials were used by the researchers to evaluate the learning design (Sugiri et al., 2020). Researchers conduct formative evaluations to ascertain the quality and suitability of developed systems. The evaluation phase occurs following the conclusion of each series of activities in the fourth stage (expert validation and product trials). The evaluation stage is based on expert validation and product trials. (Pamungkas & Azmi, 2021).

This stage-by-stage evaluation developed by Lee & Owens consists of two components: formative and summative evaluation. Developers evaluate only up to the formative evaluation stage in this development. Researchers conduct formative evaluations to ascertain the quality and suitability of developed systems. The evaluation phase occurs following the conclusion of each series of activities in the fourth stage (expert validation and product trials). The evaluation stage is based on expert validation and product trials.

3. Result and Discussion

This product development process resulted in the creation of a brain-based online learning design model. This learning model has the potential to significantly improve tertiary education. The design model for brain-based online learning is packaged in such a way that it can be applied at the university level. This brain-based online learning design model is believed to be capable of meeting the unique needs of each learner through their learning activities. This brain learning model has been modified to incorporate additional characteristics that enable it to adhere to the learning criteria of the disruptive era. The brain-based online learning designs that have been developed have had a significant positive impact on the advancement of education worldwide. Learning, of course, will

have meaning for each student who goes through it with a brain-based online learning design. This is a new era of education. This is because the learning activities in this brain-based online learning design incorporate technology. Everything that gives students meaning will be incorporated into brain-based online learning designs.

When developers create brain-based online learning designs, they not only create syntax for learning, but also create learning designs, learning media, and learning materials that support the execution of brain-based online learning designs. The developed learning syntax can be used to guide the design of brain-based online learning in education. The developed learning design describes the learning plan that was implemented using a brain-based online learning design. Additionally, developers create relevant learning media that are incorporated into brain-based online learning design models. Along with media, developers create course-specific learning materials that adhere to the syntax of brain-based online learning designs. In this case, developers are extremely intricate in their design of brain-based online learning. This is done as a demonstration of commitment to the advancement of contemporary learning at the university level.

The developer collects data from media experts, material experts, learning design experts, and users to determine the feasibility and effectiveness of this learning (students). The developer validated the materials by requesting assessments from material, syntax, and learning design experts, as well as learning media experts. Along with validation from these experts, the developer also tested the product with students who were the intended audience for the product. Individual trials, small group trials, and field trials were conducted.

To begin, the developer validates the product through the creation of a brain-based online learning design media and a manual for media experts on how to use it. A score of 89.35% was obtained based on the assessment of media experts. The score is valid. Thus, the developed brain-based online learning design media was valid. Along with learning media, media experts validated the instruction manual for their use and received an 88% score, which was also classified as valid. Along with quantitative data, developers receive qualitative feedback from media experts regarding the learning media used in conjunction with the user manual, such as (1) images in the media must be enhanced and the color gradation must be balanced. (2) enlarged illustrations in the user manual, which aids users in comprehending the contents of the usage instructions. (3) In general, the instructional media, in conjunction with the manual, are sufficient to advance to the next stage.

Second, the developer will obtain an assessment from a material expert. A percentage figure of 91.23% was obtained from the assessment of material experts for the developed learning materials and is included in the valid category. Along with quantitative data, developers collect qualitative data in the form of input from material experts in order to improve learning materials. According to material experts, adaptive learning materials in general conform to the force and motion material and are suitable for progression to the next stage.

Thirdly, the developer will obtain an assessment from a learning design expert. According to the assessment of learning design experts, the developed learning model received a percentage score of 86.35% and is classified as valid. Along with quantitative data, developers collect qualitative data in the form of input from material experts in order to improve learning materials. The learning design experts' inputs are as follows: (1) The learning design developed should be able to accommodate students' learning needs; (2) The learning design developed should use a coherent learning syntax with concise and uncomplicated sentences.

Fourth, the developer will conduct individual trials with students. Individual trials with three students were conducted to determine their suitability for using the developed product. Individual trials yielded a percentage score of 88.5 percent, placing it within the valid category. The developer received several suggestions and input from individual trials, including the following: 1) the brain-based online learning design developed has aided students in correctly interpreting lecture material; 2) the steps in the developed learning are excellent, but could be improved further in terms of explanation to make it more complex; and 3) brain-based learning is capable of accommodating each student's disability.

Fifth, the developer conducts trials in small groups. The developer chose six students as targets in a small group trial. The results of the small group trial yielded an 81.60% percentage figure. These digits can be classified into legitimate categories. Along with quantitative data, developers received responses from small groups, namely 1) that the learning developed enabled them to feel comfortable while studying, and 2) that some students desired that all learning materials be provided through the use of brain-based online learning designs.

Sixth, developers conduct field trials. The developer received feedback from 40 students during the field trial phase. According to the field trials, the developed brain-based online learning design received a score of 79.89% and was classified as valid. Based on the developer's overall assessment, it can be concluded that the brain-based online learning design developed is a suitable learning design for use in learning.

The developer collected data on the feasibility and effectiveness of this brain-based online learning design from material experts, media experts, learning design experts, individual trials, small group tests, and field tests. Material experts, media experts, and test subjects (students) all contribute to the development of products that are valid and appropriate for use in education. These inputs will be used to help developers improve the product through the use of learning designs.

Students use the responses from media experts, material experts, learning design experts, and students as a basis for revising the design of the developed brain-based online learning system. The developer's revision is beneficial because it enables the brain-based online learning design to be significantly improved and more suitable for use in learning. In addition to the developer's validity and feasibility tests, the adaptive learning materials developed must be evaluated for effectiveness. The effectiveness of adaptive learning materials is determined by comparing pretest and posttest student learning outcomes. Validity, feasibility, and effectiveness of materials for adaptive learning instruction.

4. Conclusion

According to the findings of the development research, (1) an assessment by media experts resulted in a score of 89.35% with a valid category; (2) an assessment by a material expert resulted in a percentage of 91.23% with a valid category for the developed learning materials. (3) evaluation by learning design experts, with an overall score of 86.35% for having a valid category (4) The results of individual trials yielded an 88.5% percentage score with a valid category. (5) The results of small group trials yielded a percentage score of 81.60%, with a valid category. (6) field trial received a percentage of 79.89% and was classified as valid.

Of all the processes used to determine the learning model's validity and feasibility. As a result, the design of the brain-based online learning model is feasible for use in education. Thus, all research and development activities have had a significant impact on the advancement of learning in higher education.

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