

Developing Teaching Material of Writing Scientific Paper using Constructivism Approach

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Abstract

The aims of this study are to develop teaching material using constructivism approach to improve students' skill in writing scientific paper and to test the product effectiveness of learning process in writing scientific paper in the class. Recursive, Reflective, Design, and Development (henceforth called R2D2) model was used in this research to achieve this research objective. R2D2 development model consists of four steps namely: decision, design and development, effectiveness test, and dissemination. This research refers to nonlinear focus. Decision focus was done by setting the product and participant team. Design and development focus were done by designing teaching material and development process. Development process was done by setting practitioner test, expert test, product test, and effectiveness test of product. Data of expert test, practitioner test, and product test in field were qualitative data, while effectiveness test data was quantitative data. Qualitative data was analyzed by using domain technique. Domain analysis include format, content, material organization, and language aspect of the product. Quantitative data was analyzed by using SPSS 16.0 for windows. Result of this research development is teaching material of writing scientific paper based on the constructivism approach. This product has specific characteristics that different from conventional teaching material. The features lie on the using of constructivism approach in learning with four activities, namely (a) orientation, (b) exploration of concept, (c) interpretation/concept inquiry, and (d) concept application. The result of the product effectiveness test shows that using teaching material of development product improves learning outcomes in writing scientific paper. It can be seen from the significant difference between pretest and posttest score of writing scientific paper with constructivism approach.

Keywords: Teaching material, Writing scientific paper, Constructivism approach

Introduction

Writing scientific paper is an important and beneficial skill for the students which help them to be success during their study in university (Wahab and Lestari, 2000). Scientific paper is a paper that presents idea, description, or problem solving systematically presented objectively and honestly by using standard language, and supported by facts, theories, and empirical evidence (Brusaw, Aired & Oliu, 1982). Based on that definition, there are five basic characteristics of scientific paper, namely: (a) substance, (b) format, (c) delivery strategy, (d) use of language, and (e) support. Those characteristic indicate that writing a scientific paper is a complex skill.

Accordingly, university students are more often required to make a scientific writing in the form of paper to fulfill the given task of a certain course in each semester. Usually in every course, students make two until three papers in one semester. As a scientific writing, paper has also four main characteristics, namely structure of the writing, component, author's point of view, and use of language. These main features of paper can be used as a guide for student in writing a paper. Thus, writing scientific paper is an important skill needed by university students.

Based on the results of preliminary studies and author's teaching experience, it can be identified that there are two factors which cause the lack of knowledge and skill of students in writing scientific paper, they are: the use of poor aligned approach in learning writing scientific paper and the unavailability of teaching material of writing scientific paper which has good quality based on the research result systematically and decisively. Therefore, an appropriate solution to improve students' skill in writing scientific paper is needed. One possible way is to implement constructivism approach both as an approach in learning process to make writing scientific paper seems real and a basis in developing teaching material of writing scientific paper.

This teaching material can bring benefits for both lecturer and student. For lecturer, it can be used as a reference/guide for carrying out the learning process of writing scientific paper using constructivism learning model. While for the students, it will be a guide and learning resources that can assist them in learning to write scientific paper. Besides, it is expected that the product can improve students' inspiration, motivation, creativity, and productivity in writing scientific paper. Furthermore, the objectives of this kind of learning process is to make the students to be responsible, independent, critical, creative, productive, and democratic. Social interaction in this learning process can be formed when students discuss in group, either in small or large group.

The application of constructivism approach in learning writing scientific paper is based on four activities, namely: (a) orientation, (b) exploration concept, (c) interpretation/discovery concept, and (d) application of concept

(Nunuy, 2005). Orientation activity is carried out by making some agreements between lecturer and student about material, learning process, tasks, and evaluation process. Exploration activity is carried out by asking the student to read scientific paper and number of examples of literature, browsing related material from the internet, lecturer, and inquiry, etc. Activity of interpretation/invention made by working independently, working in small group and large group, presenting the result of work in small group and large group, self-evaluation, deepening understanding of the material. In the application of concept students are asked to write a scientific paper, theme selection, identification of topic, and editing script of scientific paper.

Method of Research

R2D2 model introduced by Willis (1995) was used in this research has three focuses they are (a) definition, (b) design and development, and (c) dissemination. Focus of dissemination was not done in this research as it pertains to publish products and products implementation in field on wide scale. R2D2 model was used as model regarding to constructivism paradigm which stimulate teaching material development. Focus of definition was done by setting out the product development namely teaching material of writing scientific paper and participatory team building consisting of (a) students, (b) lecturers, (c) practitioners, and (d) experts. The expert team consists of (a) the expert of writing scientific paper, (b) learning method expert of writing scientific paper, and (c) learning technologist. Focus of design and development was done by designing teaching material and practitioner testing, expert testing, product testing, and product effectiveness testing. The test of product effectiveness was done to determine whether or not it is effective when the development product was applied in learning process of writing scientific paper. The result of other testing was used to revise the final result of the development product.

Data are divided into two types; they are quantitative (got from pretest and posttest score of students' ability in writing scientific paper) and qualitative data (consist of descriptive and reflective data got from comments, critics, suggestions, corrections, and judgments given by practitioners and the experts of the products. In addition, data are also obtained from descriptive utterance of lecturer and student both spoken and written form, teaching and learning process. Data analysis were in three segments, namely (a) from practitioner and expert, (b) product testing, and (c) the result of effectiveness testing. Practitioner and expert testing (content domain, format, and language based on teaching material developed) were analyzed by using domain analysis technique to conclude the result of analysis. Conclusions are then used to revise teaching material of writing scientific paper. The effectiveness test (score in pretest and posttest of learning process by using development product) was analyzed by using statistical analysis namely SPSS 16.0 for Windows since it has high standard in terms of sharpness and completeness of analysis. Thus, it is more accurate and complete to facilitate the researcher in interpreting the research result.

Result of Research

Development Process

The description of teaching material development of writing scientific paper is begun by the explanation of development process. Development of teaching material using constructivism approach is to improve students' skill in writing scientific paper. Teaching material is developed systematically based on the learning process order and adaptation of instructional material format given by Ministry of Education in 2008. Composition of teaching material should consider the common perception about format of material developed. Revision is conducted after teaching material tested by practitioner, expert, and material testing in learning process.

Based on the result of collaboration and sample observation, it is obtained that there are thirteen units of instructional material developed regarding to number and type of base competence. The characteristics of teaching material development are presented below.

1. Unit. It is the numerical order of teaching material.
2. Lesson topic/subject is developed by considering base competence and collaboration with lecturer by inductive pattern that relevant to constructivism approach. Within this pattern, the student can construct their own knowledge and skill learned through concept exploration activity.
3. Base competence is developed by considering standard competence, lecturer ideas, and student learning need. Base competence formulation is emphasized more on the development of three areas of competence, namely cognitive, psychomotor, and affective domain. It is intended that the student has knowledge, skill, and positive attitude in learning of writing scientific paper.
4. Learning objectives are developed according to base competence. It provides direction and target to be achieved during learning process and direction to the lecturer in implementing evaluation process and learning outcomes.
5. Learning instruction is developed based on base competence and learning objectives, lecturer ideas, student learning style, and its relevance to learning with constructivism approach. It means that learning process can

- be accomplished in accordance with learning objectives that have been defined.
6. Description of teaching material is developed in collaboration with lecturer and sample of teaching material with inductive pattern. It presents the example of teaching material related to base competence and learning objectives. These examples are used as illustration to facilitate student in understanding the teaching material. It expected that from exploration activity the student can build generative knowledge and skill on their mind constantly.
 7. Learning activity is also designed considering creative activity for student for example forming small group (4 students) to discuss teaching material relating to writing scientific paper. The role of lecturer is as a facilitator, the source of information, and problem solver.
 8. Individual activity is a kind of student worksheet that must be completed individually related to the topic being learned.
 9. Self-assessment activity is done to assess student work individually. It is also seen as reflection on student learning process to check the level of knowledge attainment and skill acquired. Student is asked to correct himself his own work if he finds any discrepancies with score in assessment rubric.
 10. Part of material deepening is developed to deepen knowledge and skill of student in writing scientific paper. Those components are arranged in order of execution of learning process, input from lecturer, examples of teaching material format, ease of implementation in learning process, and format that show learning with constructivism approach. Format indicates constructivism learning approach is shown in part (6) description of teaching material, (7) learning activities 1, and 2, (8) individual activity, and (9) self-assessment.

After the completion of design process, the next development step is practitioner test and expert test to solidify teaching material development product. Collaboration with practitioner and expert is done to obtain input from practitioner and expert. Practitioners who validate the teaching material are the lecturers who teach Indonesian Scientific subject and writing scientific paper. Group of experts appointed to conduct test were the expert of learning content of writing scientific paper (EoC), expert of learning of methodology of writing scientific paper (EoMet), and expert of learning technologists (EoLT). Results of review by expert group are in form of comment, suggestion, criticism, and appraisal guideline as outlined in assessment or put directly in format of instructional material.

Collaboration with practitioners and experts is to test the overall instructional material consisting of nine essential components, namely (a) lesson topic/subject, (b) base competence, (c) learning objective, (d) learning guidance, (e) description of teaching material, (f) learning activities 1, 2, and 3, (g) individual activity, (h) individual assessment, and (i) deepening of material. These practitioners and experts are also given the authority to provide comments, critics, suggestions, improvements, and judgments on other aspect beyond these nine essential components of teaching material such as font type and consistency of terminology, product physical appearance, graphic display, and material lay out.

The results of experts and practitioners assessment are grouped based on following critical component in instructional material, namely (a) cover, (b) feasibility of content, (c) presentation, (d) layout, (e) graphic, and (f) language. At the end of this section, the other aspects of teaching material, such as font type and consistency of terminology, physical appearance, display graphic, and lay out are also judged. Below is the complete explanation.

Cover

The cover of the material is assessed based on: a. show harmony and b. show attractiveness (in selecting illustration/drawing in accordance with content of teaching material). Based on the assessment, it is found that material cover needs to be revised or redesigned to look more attractive, more relevant between material cover/learning content, and easily recognizable from distance. The revision of material cover put directly on development product of teaching material. The assessment is shown on the table below.

Table 1. The Assessment of Teaching Material Cover Component

No.	Data Source	Test Result
1.	Practitioner 1	It is too general
2.	Practitioner 2	It is commonly used
3.	Practitioner 3	Need to have a more attractive design
4	EoC	Get help from lay out/cover designer to make it more attractive
5.	EoLMet	Redesigned to make it more attractive
6.	EoLT	Too stereotype, ask for help from a book cover designers

Eligibility of Content

Eligibility of content in teaching material is evaluated based on the (a) show compliance with standard competence and base competence, (b) show suitability of learning need of student in writing scientific paper, (c) show its suitability for teaching material of writing scientific paper, (d) show compliance with substance of writing scientific paper, (e) show conformity with benefit to addition of insight knowledge, and (f) show

compliance with values and social morality in teaching material. From the evaluation, it is found that the feasibility of material/content of learning is appropriate to the need of learning of writing scientific paper. Material/learning content development product is viably implemented in learning process of writing scientific paper. The detail is presented in the table below.

Table 2. The Assessment of Eligibility of Material/Learning Content Component

No.	Data Source	Test Result
1.	Practitioner 1	It is appropriate
2.	Practitioner 2	It is appropriate
3.	Practitioner 3	It is appropriate
4.	EoC	It is very appropriate
5.	EoLMet	It is appropriate
6.	EoLT	It is ok

Technical presentation

Technical presentation of instructional material is evaluated based on the (a) show clarity of purpose, (b) show feasibility of presentation order of presentation, (c) show student learning motivation, and (d) show completeness of information in material. From the evaluation, it can be seen that technical feasibility of instructional presentation of material is appropriate. The complete evaluation is presented below

Table 3. The Assessment of Technique Presentation of Teaching Material Component

No.	Data Source	Test Result
1.	Practitioner 1	It is appropriate
2.	Practitioner 2	It is appropriate
3.	Practitioner 3	It is appropriate
4.	EoC	It is very appropriate
5.	EoLMet	It is appropriate
6.	EoLT	It is ok

Lay Out

The material layout is review by considering (a) show compatibility appearance of layout consistency, (b) show harmony in determining layout, and (c) show harmony in determining layout to facilitate understanding of teaching material. From the review, it is found that the expert assistance/book designer/lay outer is needed in publishing to organize teaching material to make it look more attractive and easily understood by student. The review is shown on the table below.

Table 4. The assessment of Teaching Materials Lay Out Component

No.	Data Source	Test Result
1.	Practitioner 1	Need to be restructured
2.	Practitioner 2	Need expert (book designer) help
3.	Practitioner 3	Need expert help to get good lay out
4.	EoC	Need expert help to lay out
5.	EoLMet	Need lay out by expert
6.	EoLT	Ask expert assistance/book designer/lay out in publishing

Graphic

Graphic component of material is evaluated considering (a) show suitability the use of font (type and size of letter), (b) show suitability of layout, and (c) show suitability of design and display material. From the evaluation, it can be seen that it is necessary to have expert assistance/book designer/ in publishing to organize of teaching material graphic to look more attractive and easily understood by student. Revision of material graphic component put directly on teaching material development product. The complete evaluation is presented below.

Table 5. The Assessment of Teaching Materials Graphic Component

No.	Data Source	Test Result
1.	Practitioner 1	Need to be restructured
2.	Practitioner 2	Need expert help to redesign
3.	Practitioner 3	Need expert help to have good lay out
4.	EoC	Need expert help to lay out
5.	EoLMet	Need lay out by expert
6.	EoLT	Ask expert assistance/book designer /in publishing

Linguistic

Component of language in teaching material is reviewed by paying attention to (a) readability appearance, (b) show clarity of information, (c) show compliance with Indonesian standard rules, and (d) show the use of Indonesian effectively and efficiently in teaching material. From the practitioner and expert review, it is found

that component of language of teaching material is appropriate. It is stated that the use of Indonesian language in teaching material is in accordance with the rules of Indonesian Language. Teaching material is communicative and easily understood and internalized by student. The detailed review is shown below.

Table 6. The Assessment of Linguistic Component in Teaching Material

No.	Data Source	Test Result
1.	Practitioner 1	It is appropriate
2.	Practitioner 2	It is appropriate
3.	Practitioner 3	It is appropriate
4.	EoC	It is very appropriate
5.	EoLMet	It is appropriate
6.	EoLT	It is ok.

The revision of important component of teaching material is based on the practitioners and experts evaluation as described above, namely comment, critics, suggestions, improvements, and as outlined in assessment and form of teaching materials. The revision of teaching material is also done in terms of mistyping, diction use, physical appearance, graphical display, layout, formatting, content, and language. The result of the revision is a thirteen - units of teaching materials which is steady and ready to be tested in teaching and learning process.

The trial of teaching material is done through collaboration with lecturer and student to engage lecturer and student in process of development of teaching material. It is important because student and lecturer as potential user that should know the process of teaching material development. Teaching material is tested into two stages, namely; test of material in small group and test of material in large group to obtain as much input as possible from lecturer and student. Broadly speaking, the results of pilot testing of teaching material are explained below.

First, in general, the development of the teaching material can be tested and implemented properly in learning process. This is possible because lecturers are also involved in development/design of teaching material. Second, there are some weaknesses found in teaching material such as mistyping, text readability, error of words and terms used, sentence not clear, lack of clarity in learning task, and overlapping materials that have similar properties in organization of teaching material. Ambiguity sentence is found in learning activities 1, 2, and 3 which make the students confused in doing the learning task.

Third, there are some things that need to be considered by lecturer in teaching of writing scientific paper with constructivism approach. Lecturers need to prepare student mentally as well as possible. Student need to be told from beginning that active participation in learning process is the important and demanding key. Students are required to build on their own knowledge and skill from beginning to write series of scientific paper. They are also required to interact with material, peer, and knowledge and skill resource to acquire scientific knowledge. Lastly, it takes relatively a lot of time in the implementation of learning with constructivism approach because using constructivism approach means to set up learning orientation process to final agreement.

The revision of teaching material is done after each material tested in each meeting by having reflection and discussion with the student and lecturer during teaching and learning process. The improvement result put directly in the revision of teaching material which at the end of the development process, a better thirteen topics/instructional material unit of writing scientific paper with constructivism approach is produced.

The Development Product

The development product is ready to be implemented in learning process by all parties to improve student skill in writing scientific paper, process quality, and quality of learning outcomes. The final product of teaching material development is briefly presented below.

Teaching material can determine student success as whole in teaching and learning process. Therefore, preparation of instructional material by lecturer is important. Teaching material is essentially an integral part of syllabus, namely planning, prediction, and projection that will be carried out during learning process. Broadly speaking, it can be stated that teaching materials are knowledge, skill, and attitude that must be mastered by student in order to meet a predetermined standard competence. In addition, teaching material plays important part in curriculum to reach the target which should be related to standard competence and base competence to be achieved by student. Specified material for learning activities should really support the achievement of standard competence and base competence, as well as indicator of learning achievement. There are some things that should be considered in selecting teaching material such as type, scope, sequence, and treatment of these materials. Here are two steps to prepare teaching materials.

1. Identify standard competence and base competence

Before preparing teaching material, prior identification of those aspects of competence including cognitive, psychomotor, or affective need to be learned or mastered by student. These aspects need to be determined because each type of standard and base competence requires different material in learning process. Cognitive domain covers knowledge, comprehension, application, analysis, synthesis, and evaluation. Psychomotor domain

includes early motion, semi-routine, and routine. Affective domain includes response, appreciation, assessment, and internalization.

2. Identify types of teaching material

Identification process is related to compatibility between materials and level of activity/learning domain. Appropriate materials need to be determined based on cognitive behavior which emphasizes on intellectual aspects, such as knowledge, understanding, and thinking skill. Thus, types of material such as fact, concept, principle, and procedure are suitable for cognitive aspect. Besides, affective domain is determined by behavior that emphasizes on feeling and emotion, such as interest, attitude, appreciation, and how to adjust himself. Types of appropriate material for this domain are giving response, acceptance, internalization, and assessment. In addition, psychomotor domain is determined by behavior that emphasizes on sensory-motor skills. Type of material suitable for this domain consists of initial movement, semi-routine, and routine, such as writing, drafting, design, and others.

Material should be properly identified so that the achievement of competence can be measured. Each type requires a method of teaching, strategy, media, and evaluation system which are different. By identifying types of material that will be taught, lecturer can determine which teaching method will be used. Therefore, teaching material has some strategic functions as follows: a. guideline for lecturer who will direct all activities in learning process, as well as substance competency that should be taught to the students, b. guideline for student who will be directed all activities in learning process, as well as substance competency to be learned and mastered, and c. evaluation of achievement/mastery of learning outcomes for lecturer.

Based on the explanation above, in this study the teaching material is developed based on learning sequence of writing scientific paper with constructivism approach. The sequences are: (a) orientation, (b) exploration of concept, (c) interpretation/invention of concept, and (d) application of concept. Teaching material has been developed through series of tests, namely practitioner test, expert test, field trial, and test of effectiveness of product for benefit of improving student skill of writing scientific paper, quality of process, and quality of learning outcomes.

This development of teaching material refers to base competence in learning of writing scientific paper. Base competences that developed into teaching material are thirteen points. Therefore, teaching materials are also developed in thirteen units shown as follows: 1. concept of scientific writing 2. concept of scientific paper, 3. choosing theme and identify topic, 4. topic limitation, 5. formulation of title, 6. formulation of problem, 7. formulation of paper thesis, 8. formulation of paper framework, 9. development of idea and paragraph cluster, 10. quotation, 11. use Indonesian correctly, 12. references, and 13. editing paper.

Based on the result of adaptation, the characteristics of teaching material development consists of seven major components, namely (a) Unit - to ..., (b) Learning instruction, (c) Description of teaching material, (d) Learning activities 1, 2, and 3, (e) Individual activity, (f) Self-assessment, and (g) Study material as follow up. Those components are arranged in order of learning process, input from lecturer, examples of teaching material form of writing scientific paper, ease of implementation in learning process, and the form that show characteristics of constructivism learning in part (c), (d), (e), (f), and (g) above. The implementation of learning process through constructivism approach is seen from four activities, they are: orientation, exploration of concept, interpretation/inquiry concept, and application of concept.

Effectiveness Test of Development Product

The purpose of effectiveness test is to obtain information about the product effectiveness in learning process of writing scientific paper. Effectiveness test was done by performing different test to get students' achievement before and after learning process by using development product (treatment) in single group. From statistical test, it is found that there is significant difference between pretest mean score was 74.96 and posttest was 89.04. the average score gained from implementation of this (use development product) was 14.08. The result of paired sample t test (single group) showed significance (2 tailed) $p = 0.000 < \alpha = 0.005$. It means that the use of development product of teaching material in learning process of writing scientific paper using constructivism approach is significantly affect students achievement in writing scientific paper.

Discussion

The use of development product of teaching material in learning process of writing scientific paper using constructivism approach has some advantages. Constructivism approach is used as a base in developing teaching material (Clements & Batista, 2002). The result of this development also proves superiority of constructivism approach compared to approach of behaviorism/conventional in process of learning of writing scientific paper. Constructivism approach as model of generative learning is able to improve student writing skill, scientific paper, quality of process, and quality of learning outcomes.

Learning with constructivism approach aims to provide an opportunity for the students to be responsible for completing common task. Besides, it can motivate student to perform variety of challenging and creative

learning activities. Therefore, constructivism approach can be used to develop learning process of writing scientific paper in college in general. Here is presented some issues dealing with the writing scientific paper learning using with constructivism approach in higher education.

Writing scientific paper can be acquired with continuous practice. Using constructivism approach, skill of writing scientific paper can be obtained through learning by using teaching material based on the development product. Furthermore, learning with constructivism approach is said to be of self learning (Piaget, 1981). Self-learning means learning on the basis of ability to build on his own knowledge and skill through number of significant interactions with supportive environment and socio-cultural environment (Vygotsky, 1978). In this case students are also given flexibility to develop their own learning strategies and styles.

Lecturer can assist the process to make learning be more meaningful and informative to provide opportunity for student to discover or implement their own ideas. In learning writing scientific paper with constructivism approach, the roles of lecturer are no longer dominant as source of information, knowledge and skill. Their role can be replaced with teaching material that have been prepared, but not entirely replaced. Thus, making learning to be more meaningful both for students and lecturer, constructivism approach is a good solution to be implemented.

Teaching material that have been developed are designed and carefully structured so that student is not only easy to understand the concept about writing scientific paper but also can practice writing scientific paper independently. Competence map has been formulated and well-drafted, description of teaching material delivered systematically, and examples have been clearly spelled out. Similarly, training and guidance given on an ongoing basis so that the expected competence, which express good idea, requirement of good paragraph compose, effective sentence, choosing word/diction appropriately, applying rule of writing, spelling and punctuation correctly, and pay attention to rule of scientific writing in text can be achieved by the student.

Regarding to evaluation process, the learning of writing scientific paper in college can be done in two ways, namely process evaluation and evaluation of learning outcomes. Evaluation process is conducted to determine the pattern of students' interaction, initiative, creativity, and performance during the learning process of writing scientific paper. Evaluation of learning process is done by using observation sheet instrument and learning journal of development product to measure student achievement of writing scientific paper. While, the evaluation of learning outcomes is done by using assessment rubric and portfolio instrument of development product. The evaluation of learning writing scientific paper is to determine the student achievement in writing scientific paper. It is designed and prepared in accordance with teaching material, learning process, aspects that must be mastered in activities in writing scientific paper, and result of writing scientific paper.

Learning with constructivism approach requires seriousness and high democratic (Basuki, 2008) because student learning facilities and mental readiness should be prepared. Democratic atmosphere is necessary to create learning environment that is open minded, willing to accept suggestion, opinion, and ideas which are different, avoid domination of one party, and help each other, and shared responsibility. Democratic qualities in such learning should be developed to prepare student to face all problems of an increasingly complex nation.

The result of this research is relevant to Zulianto finding (2007) about development of argumentation learning model based on process approach for Junior High School class VII. It is said that development of teaching material can improve the bquality of argumentation writing process and learning outcomes of student in writing argumentation in Junior High School class VII. Besides, Sukirno's study (2008) also on the development of learning in writing narrative device model with quantum learning strategy on Senior High School student. His findings said that the development of teaching material can improve quality of narrative writing process and learning outcomes of narrative writing in Senior High School student. Last but not least, the result of Syamsi' research (2011) on the development of writing learning instrument based on process-genre approach for Junior High School student. The findings stated that development of teaching material of writing by process-genre approach can also improve quality of process and learning outcomes of students' writing in Junior High School. Based on the results of development research, it can be stated that the result of teaching material development of writing scientific paper in this study supports the results of previous development research, which can be used to improve the quality of learning process and learning outcomes of writing scientific paper.

Conclusion

It has been proven that the implementation of development product of teaching material improve students' skill in writing scientific paper. It can be seen from two aspects, namely an increase both in students' active participation both physically and mentally in learning process and students' achievement in terms of increasing in their learning outcomes. From statistical analysis, it is found that there is significant increasing of students' score in pretest and posttest. The improvement is also shown from the comparison between scores of learning outcomes using development product of teaching material with constructivism model and conventional model. It shows that learning model with constructivism approach can improve the quality of students' learning process

and outcomes significantly particularly in writing scientific paper.

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