

Analysis of Content and Instructional Design of Open and Distance Teaching Material

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Abstract

Teaching material is a very important aspect in the open and distance higher education. The material in the open and distance higher education can be used to replace the role of lecturer. Therefore, the teaching material on open and distance higher education must have complete, *updated material* and the adequate instructional design. The purpose of this research is to analyze the feasibility of instructional content and design of teaching material on the Environmental Education course on Faculty of Education and Teacher Training of Universitas Terbuka. The study is limited only on 2 modules from the teaching material; module 2 on Human Being, Energy, and Natural Resource, and module 7 on Ethics of Environment. Those two modules were presented to 3 experts in its field and 1 expert of instructional media/design to analyze in terms of feasibility, instructional content, and design based on their expertise. The study of material by the expert was done by giving the comment directly to the teaching material and through the assessment form of teaching material that was provided. To understand the result of study by expert more comprehensive, the interview was also conducted. The collected data were analyzed by using the descriptive-qualitative technique. The result of research shows that the material of those two modules was not adequate anymore to use as the teaching material for distance education in terms of the lack of revision of its content and its instructional design.

Keywords: Content, instructional design, environmental education, open and distance higher education

The printed teaching material is a very important aspect in the learning process of Open University. It can be said that the printed teaching material that is commonly referred as module can be used as the lecturer for the students of distance education at Universitas Terbuka in particular. It indicates the importance of printed teaching material for the learning process at Open University.

The improvement of printed teaching material at Universitas Terbuka is done based on the standard procedure of ISO 9001-2008, in which the improvement of printed teaching material is compiled by the experts. After it is compiled, the draft of teaching material is studied by the expert to give the feedback on the draft. After that, the revised draft is studied by the lecturer in terms of its language and instructional design. In the writing of this teaching material, the writer or editor of the teaching material is informed with the draft of course including the instructional analysis, outline of teaching program, report of teaching material review (Open University, 2011).

Based on the procedure of improvement on printed teaching material, it apparently does not use the standard of *research and development*, while the revision of teaching material does not refer to the standard of *formative evaluation* completely. It is common in the writing of any book in Indonesia and it also happens in United States of America. Dick, *et.al* (2009) also stated that there are thousands of products for learning process sold in United States of America every year based on the result of research and those products are not evaluated by the learner and there is no revision before the distribution.

Evaluation of teaching material in several countries is apparently in the research of the expert, not the obligation nor standard procedure in the making or revision of teaching material. Dick, *et.al* (2009) stated that the test on the teaching material is conducted on one learner before it is revised to show the significant difference on the effectiveness of teaching material. Some researchers have conducted the formative evaluation procedure not only on the printed teaching material, but also *online* teaching material, on the curriculum. Stewart *et.al.* (2004) conducted formative and summative evaluations to analyze the perception of learner on the online courses, thus the advantage and weakness of the program can be identified to revise it. Yoshida (2010) who conducted the research on "*development and formative evaluation of the educational media in-service curriculum standards*"; Jha & Duffy (2002) with the title "*ten golden rules for designing software in medical education: results from a*

formative evaluation dialogue. All formative researches are intended to evaluate and revise the teaching material or the learning program.

Unlike the analysis above, it is the moment for Universitas Terbuka to consider the new policy related to the development and revision of teaching material. It does not mean that the current teaching material is not adequate, but it can be better to make the writing of teaching material refer to the adequate teaching material, through research and development (R&D) and evaluation (formative and summative). Stufflebeam & Shinkfield (2007) stated that the formative evaluation is the integral part of the development process. They also stated that the formative evaluation is done to help people improve the "quality" on everything they develop, do, or convey. When the writing pattern of teaching material is implemented as the new policy, the quality of teaching material at Universitas Terbuka in the future will be definitely better.

In terms of revision on teaching material, the researcher is interested to analyze the instructional content and design on the teaching material of course "Environmental Education" as the beginning of the formative evaluation. The choice of teaching material for course is based on the fact that the teaching material is used by many students, the students of Bachelor Program of Elementary School Teacher Education and Biology Education. This course was protested by the students, especially the students of Elementary School Teacher Education who got unsatisfying score and many of them failed (with score E). The analysis of problems on 3 periods of exam (2010.1, 2011.1, and 2011.2) shows that around 50% of problems should be revised, but the majority of constructions of those problems are still quite good when they are studied further. This condition shows that many students cannot understand the teaching material well during the exam and the variation of problem is not optimal. Therefore, the quality of teaching material for the course is interesting to study.

Based on its background, the formulation of problem is compiled as follows:

1. Is the presented material on teaching material of Environmental Education suitable with the knowledge and sophistication factor?
2. Is the teaching material on Environmental Education able to fulfill the principle of instructional design for distance teaching material that is adequate?

Based on the problem statement above, this research is intended to get the information as follows:

1. Is the presented material on teaching material of Environmental Education suitable in terms of knowledge and sophistication factor?
2. Is the teaching material on Environmental Education able to fulfill the principle of instructional design for distance teaching material that is adequate?

Problem Limitation:

Due to the limitation in terms of time and budget, the teaching material that is used as the object in this research is only limited for two modules, module 2 on Human Being, Energy, and Natural Resource, and module 7 on Ethics of Environment. It is based on the advice from the result of previous content analysis by Dr. Mardi Wiyono from State University of Makassar.

Research Methodology

This is the qualitative research on the quality of teaching material (evaluation of teaching material). This research is the initial stage of the formative evaluation on teaching material in revising the teaching material of Educational Environment that has been developed and used by college students for years.

Place and Time of Research

This research was conducted from June until September 2012. The place for this research was 3 institutions of experts, State University of Malang, Indonesia University of Education, and Open University.

Data Collection Method

Subject of Research

The subjects of this research were the experts on the teaching material and instructional design. In this research, the study of material was conducted by 4 experts, 3 experts on the material and 1 expert on media and instructional design, with the details as follows:

1. Prof. Dr. Sugeng Utaya, M.Si (Expert of teaching material)
2. Prof. Hertien Koosbandiah Surtikanti, MSc. ES. P.hD (Expert of teaching material)
3. Dr. Bambang Supriatno, M.Si (Expert of teaching material)
4. Dr Ir. Amalia Sapriati, MA (expert of media and instructional design)

Instrument of Research

Type of instrument in this research is *check list*/scale of assessment and guidance of interview. These types of instrument were compiled with different material and subject of research. In other words, the guidance of interview and assessment scale, for the expert on teaching material and instructional design, are different from each other since they have different skill.

Data Collection Procedure

In this data collection procedure, the steps were determined as follows:

1. Determining subject of research. The subject in this stage was the expert of material, media, and instructional design instead of the researcher as the instructional developer. As what was stated by Suparman (2001), the review by the expert of study instead of the instructional developer is important to ease the opinion of other people, as the expert in that field, especially in terms of the content of instructional product. The required experts in this research were 3 experts on material and 1 expert of instructional design and the media.

2. The steps of review by experts

First, researcher presented the teaching material to review to 3 experts of material at two colleges (1 lecturer of State University of Malang and 2 lecturers of Bandung University of Education). The guidance of review and assessment scale was sent through postal service to expert at Malang, while the researcher met the expert at Bandung in person.

One week later, the researcher visited the experts of material to conduct structured interview to get more comprehensive advice. The used instrument was the guidance for structured interview. The sound recording device was needed to record something that cannot be recorded easily. The same treatment was also used on the expert of instructional design.

Data analysis

The collected data were analyzed descriptively, by collecting the data for research in terms of the result of assessment scale of teaching material by the expert of material and instructional design, as well as the result of discussion and interview. The collected data was selected and categorized based on its indicator and it was then reduced and summarized. The summary of the data was then described to answer the existing problem.

Result And Discussion

Result of Research

Analysis of material and instructional design of module 2 Human Being, Energy, and Natural Resource

Based on the result of study by 3 experts of material and 1 expert of media and learning design, it can be said that the data from module 2 was collected like what is shown in table 1.

Table 1 Resume of Study Result by Expert of Module 2 Human Being, Energy, and Natural

No	Criteria	Result of Study
1	Validity of material in terms of science	The material must be revised based on the advice of the experts (some terms must be checked and there are some confusing concepts (100% of experts).
2	Sophistication of material	The sophistication of material must be <i>improved</i> (it did not contain the national and global policy of energy, current example and fact), (66.7%)
3	Completeness of material analysis	The analysis is not complete and it needs real, current examples (100% of experts)
4	The comprehensiveness of material based on the Bachelor Program.	Enough, but the presentation must be revised to make reader understand it more easily (33.3%).
5	Relevance of material with instructional purpose	Relevant, there are instructional purposes that are not discussed in the analysis (33% of experts)
6	The suitability of strategy, method, and media of presentation with the material.	It needs illustration, example, and current information (66.7% of expert)
7	The suitability of strategy, method, and media of presentation with the instructional purpose.	Strategy and analysis of material must be revised, in terms of coherence to achieve the instructional purpose (33.3% of experts)
8	Logic, orderliness, and coherence in the analysis of material.	The coherence must be revised (33.3% of experts)
9	Time for learn the material	Enough
10	Relevance of task, training, and test with the presented material	Relevant

As shown in Table 1, it is obvious that 8 criteria from 10 existing criteria need revision and the most inappropriate aspect is validity, completeness of material, sophistication, and suitability of strategy, method, and media of presentation with the material. In terms of validity, there are some confusing terms, such as the terms conservation of energy and material, eating each other, and other confusing terms.

Prof. Hertien commented that:

Validity and sophistication of module 2 are still low, in which it still has some questionable concepts and it does not refer to current reference. The term energy derivative should be changed into renewable energy, definition of pollutant as the natural product is confusing, and it needs the data on the percentage of renewable energy in Indonesia. There are many illustrations taken from old references and the references have been revised, thus the update is needed (result of interview).

Related to the completeness of material, it is not satisfying and some current examples are needed. Prof. Sugeng Utaya stated that: "The explanation of module 2 is almost always incomprehensive." Related to the sophistication of material, it must be *updated* since it does not have the national and global policy of energy systematically, and it needs current examples and facts. Related to the

suitability of strategy, method, and media of presentation with the material, it still needs revision. Two from three experts stated the importance of additional information and current example. Comprehensiveness of material; relevance of material with purpose; suitability of strategy, method, and media of presentation with purpose; logic, orderliness, and coherence in presenting the material must be revised, but it was only suggested by one of three experts of material. Other criteria, time for learning and relevance of task, training, and test with material is good enough.

The media study on module 2 showed the same result and it is shown in Table 2 below.

Table 2. Resume of Study Result by Expert of Media and Instructional Design of Module 2 Human Being, Energy, and Natural Resource

No.	Result of Study
1	The scope of module is not adequate, there is only one learning activity, the lack of relevance between law of energy and natural resource.
2	The guidance for learning is not included
3	The analysis of material does not refer to the specific competence, but it refers to module 2
4	In terms of analysis of material, it still needs explanation on the relevance of laws of natural resource and the management
5	The lack of example and the absence of example
6	Illustration must be added
7	The training is relevant, but the relevance between law of energy and conservation is not obvious.
8	The guidance for answering the problems in the training must be revised and the <i>clue</i> is given to answer the problems.
9	The summary is less adequate and it should be written in sentence not the pointer.
10	Formative test is not suitable (formative test gives the examples)
11	The guidance assesses the success of study and the new version is needed
12	Number of learning activity and page is not suitable with the standard of Open University, it is only one learning activity and 30 pages.
Language	
1	The language is not communicative and it is written in language of textbook.
2	The variation of language is not enough and interactive.
3	The sentence is effective, but it still uses the language of textbook and it is not interactive.
4	There are terms that are not described, such as entropy and ecological apocalypse.
5	The absence of term list

As shown in Table 2 above, it is obvious that the teaching material of module 2 is less adequate in terms of media and design. The most fundamental aspect is that the module only includes one learning activity, while the rule of writing the teaching material in Universitas Terbuka determines at least one module for 2 learning activities. Besides, this module does not include the instruction for learning, example and non example, and the lack of illustration. The existing exercise does not get the signs for answering the problem and the summary is still in pointer. In terms of used language, it is not communicative since it uses the language in textbook, not the module.

The analysis of material, media, and instructional design of module 7 Ethics of Environment
Based on the result of study on material by 3 experts, the result is summarized in Table 3 below.

Table 3. The Resume of Study of Expert on Module 7 Ethics of Environment

No.	Criteria	Conclusion
1	Validity of material in terms of science	It is still questionable and it needs additional references (100% of experts)
2	Sophistication of material	The sophistication of material must be updated (the material is not valid anymore) (66.7% of experts)
3	Completeness of material analysis	The explanation is almost incomplete and it needs additional examples on ethics of environment and local wisdom (100% of experts).
4	The comprehensiveness of material based on the Bachelor Program.	Enough, but the method of presentation must be revised since it is less chronological and it makes the learning difficult for college students (33.3% of experts).
5	Relevance of material with instructional purpose	Relevant, but some purposes are not achieved and the local wisdom was not discussed (66.7% of experts)
6	The suitability of strategy, method, and media of presentation with the material.	The suitable illustration must be added (66.7% of experts)
7	The suitability of strategy, method, and media of presentation with the instructional purpose.	Strategy and analysis of material must be revised, especially for the ethics of environment in learning process since it is still normative and the task/information from the internet should be added (66.7% of experts)
8	Logic, orderliness, and coherence in the analysis of material.	the coherence must be revised and it is less chronological (33.3% of experts)
9	Time for learn the material	Enough
10	Relevance of task, training, and test with the presented material	Relevant

Like what is shown in Table 3, it is obvious that 8 criteria from 10 criteria must be revised and 6 of them is really bad since it must be revised soon. Those six criteria are validity of material, sophistication of material, completeness of discussion, relevance between material and purpose, and suitability of strategy, method, and media with material and instructional purpose.

Those six criteria definitely need revision. Validity and sophistication of material are two important aspects that really determine the quality of understanding for college students since the invalid material makes the learning process of college students as the learner wrong and outdated. In terms of validity of material, Dr. Bambang Supriatno stated that:

"The presentation of module 7 is still questionable since the used reference is not adequate. Besides, the presented material is outdated, especially that is related to the facts and real examples. Besides, the material is less complete since the local wisdom is not discussed and the implementation of ethics of environment in the learning process is not completely discussed and it is still normative. The example of local wisdom of Baduy people in terms of nature conservation is very suitable to use as the topic in explaining ethics of environment. Besides, there are other examples of local wisdom such as organic village, Biarawati, in West Nusa Tenggara and the winner of Kalpataru Award in improving the analysis of material" (Result of interview).

The same thing was also stated by Prof. Sugeng Utaya as follows:

"Validity of teaching material in module 7 is questionable since the used reference is less adequate and the discussion is not complete; there is lack of real examples and it is still normative and general. The used data in this writing is too outdated and it needs update with the newest data".

The comprehensiveness of material and logic, orderliness, and coherence in the analysis of material must be revised, but it is only proposed by one of three experts. It is important since the most common opinions are not always right and an opinion from one person can be more meaningful than other people in the qualitative research. Like module 2, module 7 is also related to the required time to learn module and relevance of task, exercise, and test with material is suitable.

The result of media study and instructional design of module 7 also still needs many revisions. The details of study results are summarized in Table 4 below.

Table 4. Resume of Study Result on Media and Instructional Design of Module 7 Ethics of Environment

No.	Result of Study
1	Scope of module is not adequate, there is only one learning activity and there is no implementation in the learning process.
2	The guidance for learning is not included
3	Analysis of material does not refer to KK since there is no implementation in the learning process.
4	In terms of analysis of material, it still needs explanation on environment awareness and its implementation in the education.
5	The lack of example and the absence of example
6	Illustration must be added
7	The absence of exercise
8	The summary is less adequate and it should be written in sentence not the pointer.
9	Formative test is not suitable with KK, there are no ethics and problems of environment.
10	The guidance assesses the success of study and the new version is needed
11	Number of pages and learning activities is not suitable with the standard of Universitas Terbuka which there are only 18 pages and 1 learning activity.
Language	
1	The language is not communicative and it is written in language of textbook.
2	The variation of language is not enough and interactive.
3	The sentence is effective, but it still uses the language of textbook and it is not interactive.
4	The absence of term list (glossary).

Based on Table 4 above, it is obvious that the quality of instructional design on module 7 is very inadequate and it does not fulfill the principle of writing independent teaching material. It is seen from several aspects since the scope of material is not adequate with only 1 learning activity, there is no learning instruction and exercise. The analysis of material does not include all purposes and the examples are not enough, while the used language is similar with the textbook.

Discussion

Quality of Material

Like what is shown in Table 1 and 2, it is obvious that the teaching material of Environmental Education in module 2 and module 7 is still far from what is expected by Universitas Terbuka as the independent teaching material in general. Module 2 and module 7 do not fulfill the validity, sophistication, and completeness in the discussion. It is definitely unsuitable with the requirements of teaching material in general, not only as independent teaching material. As what was stated by Dick, Carey, and Carey (2005, in Culala, 2009 and Mann, 2006), "independent teaching material must fulfill the accuracy, sophistication, consistency in terms of education, including example, exercise, and feedback that are realistic and accurate, while the strategy of presentation must be consistent with the

current instructional theory and it is suitable with the need of college students". From the rules and regulations that were stated by Dick, Carey, and Carey, it is obvious that those two teaching materials do not fulfill the requirements completely.

Module 2 has weakness especially on the criteria of validity, completeness of material, sophistication, and suitability of suitability, method, and media of presentation with purpose. The weaknesses of module 7 are almost the same; they are validity, completeness, sophistication, relevance of material and purpose, suitability of suitability, method, and media with material and purpose. This condition shows the low quality of those two modules. According to Dick, Carey, and Carey (2005, in Culala, 2005, and Mann, 2006), independent teaching material that is suitable at least should fulfill the accuracy and sophistication aspects. Those two modules are inaccurate and unsophisticated, while the completeness in the discussion, relevance of material and presentation, and used strategy in the presentation show the deficiency. Moreover, only 2 criteria from 10 researched criteria, time and suitability of test and exercise with presented material, fulfill the requirement. Considering the low quality of module, those two modules must be revised or rewritten. It is important to fulfill the demand of improvement on independent teaching material, like what is included in Universitas Terbuka(2012) stating that " to make the teaching material of Universitas Terbuka can be learned independently, the teaching material must fulfill the end competence to achieve. Besides, the presented material must fulfill the validity of content, accuracy, sophistication, completeness, and system based on the principle of independent teaching material".

Quality of Media and Instructional Design

Referring to Table 2 and Table 4, it is obvious that module 2 and module 7 do not fulfill the principle of media and instructional design for independent teaching material. Module 2 and module 7 have the fundamental weaknesses in terms of design of teaching material; those modules only include one learning activity and they have less pages than the determined pages (30 pages for module 2 and 18 pages for module 7). It definitely disobeys the rule of module writing that requires one module to have 40 pages for course of exact sciences and 60 pages for non exact sciences and the module should include 2 learning activities or more (Suparman & Zuhairi, 2009). Besides, in those two modules, there are purpose that are not achieved and there is lack of non example and example, while the used language is not communicative. This condition makes the module difficult to learn by college students of Universitas Terbuka who are required to study independently and the purposes of learning are not achieved. It is not surprising that college students cannot pass this course and it was protested by the organizer of Distance Learning Program Unit. Based on the result of analysis on problems of three exams organized by Examination Center of Universitas Terbuka(2010.1, 2011.1, and 2011.2), around 50% problems must be revised, but the majority of the problems are still good when it is analyzed further. This condition shows that many students cannot understand the teaching material well during the exam and the variation of problem is not optimal.

It is definitely not suitable with the demand of independent teaching material that requires easiness for learning and communicative aspect. As what was stated by Suparman (2004), there are three aspects that must be considered to develop independent teaching material, related to the technical quality, namely (1) simple, relevant language; (2) communicative language, such as the language used by lecturer to teach in the class, not language in textbook; (3) interesting design of module that is artistic, tidy, and fun to learn. Those three aspects are not well fulfilled on module 2 and module 7 since the use of language is like what is written on textbook and the lack of example, non example, and illustration to attract college students to learn it.

Thus, the aspects of media and instructional design of those two modules are still weak and the module is still difficult to learn by college students with independent learning system. The module of college students of Universitas Terbuka has important role since Universitas Terbuka implements distance education system that is independent. As what was stated by Suciati and Huda (1999), "As the college students of university that applies distance learning system, they are encouraged to learn

independently and the teaching material has the strategic role to determine the success of learning process”.

Based on the study of material, media, and learning design, it is obvious that module 2 and module 7 of teaching material on Environmental Education should be revised fundamentally, starting from scope of material, validity, sophistication, relevance with purpose, and design, the number of learning activity that is only 1, the number of page that is less than 40 pages, example, lack of illustration, and the use of language that is not interactive.

Discussion And Suggestion

Conclusion

1. The quality of material and teaching material of Environmental Education, especially for module 2 and module 7 is less adequate. It is shown by the fundamental deficiency, starting from validity and sophistication of material, completeness of analysis, presentation method, and relevance of presentation and purpose of learning.
2. The quality of media and instructional design on module 2 and module 7 is less satisfying since there is only one learning activity and it does not fulfill the minimum pages for module that is determined. The purpose is not achieved and there is also lack of example and non example. The used language is not communicative.

Suggestion

1. Referring to the conclusion above, those two modules must be revised comprehensively or rewritten since they do not fulfill the requirement in terms of material or instructional design.
2. In writing the teaching material, the lecturer must be able to make sure that the teaching material is suitable in terms of instructional design in the writing process of Open University.
3. For Open University, it is suggested that the writing system must be revised, especially in study process of expert, media and design analysis. Then, it should be tested toward the college students. Thus, the resulted teaching material will be more adequate in terms of content and instructional design.

Reference

- Culala, H.J.D. 2009. Designing & Conducting Formative Evaluation. <http://www.scribd.com/doc/17250287/designing-and-conducting-formative-evaluation>. [20 September 2012].
- Jha, V. & Duffy, S. (2020). Ten golden rules’ for designing software in medicaleducation: results from a formative evaluation of DIALOG. *Medical Teacher*, 24 (4) pp. 417–421.
- Mann, B.J. (2006). Conducting Formative Evaluations of Online Instructional Materials. USA:Infosci
- Stewart, B.L. (2004). Formative and summative evaluation of on line courses. *The Quarterly Review of Distance Education*, 5 (2) pp 101-109.
- Stufflebeam, D.S. & Shinkfiel, A.J. (2007). *Evaluation theory, models, and application*. USA: Johd Wiley & Son.
- Suciati dan Huda, N. (1999). *Bahan Belajar Universitas Terbuka dalam Pendidikan Terbuka dan Jarak Jauh*, dalam Tian Belawati, dkk. Jakarta: Universitas Terbuka
- Suparman, A. (2001). *Desain instruksional*. Jakarta: PAU-PPAI, Universitas Terbuka.
- Suparman, A & Zuhairi A. (2004). *Pendidikan Jarak Jauh: Teori dan Praktek*. Jakarta: PAU-UT.
- Universitas Terbuka. (2011). *Prosedur Pengembangan Bahan Ajar Cetak*. *Pekerti*. Jakarta: Universitas Terbuka.
- Universitas Terbuka. (2012). *Katalog Pendas Universitas Terbuka*. Jakarta: Universitas Terbuka.
- Yoshida, H. (2010). Development and formative evaluation of the “Educational Media In-service Teacher Training Curriculum Standards”. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 6 (3), pp. 37-55.