Good Practices in Education
Across Disciplines and Grade-Levels

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Editor
Dr. Sukatman, M.Pd.
Dr. Budi Setyono, M.A.

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PART TASK AND WHOLE TASK AS ALTERNATIVE APPROACHES TO DEVELOP INSTRUCTIONAL DESIGN

Nurul Umamah

Abstract: Part-task and whole-task instructions are alternative approaches in the field of Educational Technology. Part task is atomistic approach focusing on decomposing complex domain knowledge into skill components, whereas whole-task is a holistic approach in which complex contents and tasks are analyzed in the coherence and are taught from their simplest version towards increasingly more complex versions. Whole-task is designed to prepare learners to be flexible in adapting themselves to the new problem and situations. Several studies have found that part-task approach is not suitable for learning complex cognitive skills, due to the existence of many constituent skills. Whole-task models are better suited to learning to coordinate component skills and are preferred for tasks with a high level of organization. To deal with task complexity, simplification of the whole task and giving learnerssupport and guidance are useful approaches.
Keywords: part task, whole task, instructional design

INTRODUCTION

Faculty of Teacher Training and Education as one of education nstitutions is expected to equip their students with learning capability that must be adjusted with the needs of prospective-teacher candidate. This is in line with Gagne's opinion (1985), who says that the capability to learn in school should equip learners with diverse backgrounds and skills to improve the lives and practices in their work. The learners' performance to be able to integrate their knowledge, skills and attitudes in their habit of thinking and behavior is a core competence that must be achieved by teacher candidate. In line with Gagne's statement, one of the capabilities needed to be owned by the prospective teacher candidate is the competence of creating an instructional design.

Empirical evidence based on the researcher's experiences of 16-year-teaching of this subject shows that there are many complex problems faced bythe learners, especially in the aspect of low competence in creating instructional design. Actually, this problem has been tried to be solved through the development of teaching materials which have been validated and used in the academic year 2008/2009. However, these materials have not been able to solve the problem. The result of the research recommended task-center design (Umamah, 2008).

There are a lot of methods that can be used to develop an instructional design. However, some researchers find out that part-task and whole-task are the most suitable approaches to deal with the complexity in the process of conducting instructional design which cover analyzing, developing, and designing the instructional design. This paper focuses on discussing the role of part-task and whole-task to deal with complexity in developing instructional design.

PART-TASK AND WHOLE-TASK APPROACHES

Part-task and whole-task instructions are alternative approaches in the field of Educational Technology. The part-task approach was dominant until the late 1980's. This atomistic approach focuses on decomposing complex domain knowledge into skill components, which are distinguished based on separated learning objectives (van Merrienboer & Kester, 2008:443). However, Recently, traditional instructional system design methodologies have been criticized as being ineffective in producing the process of transfer-of-learning, particularly in the complex learning domains (Lim, et al. 2009). Related with this condition, several authors (e.g., van Merrienboer, 1997; de Croock, et al., 2002) argue that this is the result of an analytic approach that takes the component of learning out of context. To answer the criticism, the most recent instructional and learning theories tend to focus on authentic learning tasks that are based on real-world problems as the driving force for transfer of learning (van Merrienboer & Kirschner, 2007). The main goal is that such tasks are beneficial for the learners in term of: (a) help learners to integrate the knowledge, skills, and attitudes necessary for effective task performance, (b)give them opportunity to learn to coordinate constituent skills that make up complex task performance, and (c) enable them to transfer what is learned to their daily lives or work settings. For example, whole-task approach can become one of the solutions in complex learning (van Merrienboer & de Croock, 2002).

Whole-task approach is an instructional approach that applies a holistic approach in which complex contents and tasks are analyzed in coherence and are taught from their simplest, yet still meaningfull, version toward increasingly more complex versions (van Merrienboer, et al. , 2006; van Merrienboer & Kester, 2008:442). The practice of the whole- task approach (van Merrienboer, et al., 2006) consists of the application of components strategy that allows learners to see the interrelationships and their relationship as a whole.

The instructional strategy is guided by task-based approach as opposed to problem- based approach centered on the learners. Furthermore, Whole-task approach is designed to prepare learners to have flexibility to adapt themselves to the new problem and new situations (Lim, et al., 2009). In constructivism theory, the process to facilitate the learners in order to adapt themselves to the real world is known as top-down processing (Slavin, 2006:245). Top-down practices are consistent with the whole-task approach in term that whole-task approach is a holistic approach in which the tasks and content of complex materials are analyzed in a coherent form. In these terms, top-down learners start learning with complex problems to be solved and are guided to find the required basic skills (Slavin, 2006:245).

In line with that statement, Lim (2006) states that in whole-task approach, learning complex skills are practiced as a whole and then are given part by part and finally are integrated within the overall in turn. Learning in the context of whole-task approach covers the application of components of the strategy for the variation component of knowledge in a way that enables learners to see their interrelationships as a whole (van Merrienboer, 2003). For example, in the whole-task approach (Lim, 2006), a complex task (e.g., preparing a grade book in Excel) is not taught by performing each constituent skill, but rather are exposed to the entire complex skill right from the beginning of the instruction and are required to practise performing the whole task.

However, in order to reduce the learner's cognitive load, a simple version of a whole task is presented to the learners at the beginning of the instructional sequence and the complexity of the whole task is increased during the course of the instructional program.

The bottom-up strategy is relevant to the part-task approach in which the learning practices are atomistic. The tasks and content of complex materials are decomposed into elements that are more simple to achieve at a level that can be achieved by learners (van Merrienboer & Kester, 2008:442).

For example (Lim, 2006), in the part-task approach, a complex task (i.e., preparing a grade book in Excel) is decomposed into a series of smaller part skills. The instructional strategy employed for teaching this complex skill involved having an instructor teach each of the part skills and then having learners practice that skill. This process must be repeated until all part of the skills are taught and practiced.

Several studies have found that part-task approach is less suitable for learning complex cognitive skills because there are too many constituent skills (van Merrienboer, et al., 1997; Peck & Detweiler, 2000; van Merrienboer, et al., 2003 ; van Merrienboer & Kester, 2008:442). One key issue in whole task models is how to deal with the complexity of the task. To overcome this problem, most holistic approaches introduce some notion of modeling.

Part-task models have been found to be very effective to reduce the difficulty of the task but they hinder integration of knowledge, skills, and attitudes and limit the opportunities to learn to coordinate component skills. Whole-task models are better suited to learning to coordinate component skills and are preferred for tasks with a high level of organization. To deal with task complexity, simplification of the whole task and giving learners support and guidance are useful approaches that can be done (van Merrienboer & Kester,2008).

There are many researchers who have demonstrated the benefit of whole-task approach. They are: Collins et al., (1989), Jonassen (1999), Merrill (2002; 2007); and van Merrienboer (1997). In this case, Van Merrienboer, et al. (2007) support the previous research findings that state whole task can reduce difficulty task, and suggests the whole-task approach to emphasize the coordination and integration of parts of the earliest skills into a holistic vision of the entire task to deal with its complexity. The principle in this approach is that the learners start from the global skills towards the local skills.

Measuring performance level in complex tasks is in itself a complex task. Very often, the measurement used only assess the components of skill or individual actions rather than the learners' level of performance on the whole task. In this case, the measurement of task performance must reflect this gradual acquisition of skill (Merril, 2006). Meanwhile, Bunderson (in Merril, 2006) described the need for a domain theory as a scaled measurement of increasing levels of performance in a given subject matter domain. Adequate measurement of performance in complex real-world tasks requires us to detect the increasing performance demonstrated gradually by the learners in completing a whole complex task or in solving a problem. In this case, Performance assessment can be used to measure the learners' performancelevel in doing a complex task (Gronlund & Waugh, 2009).

Van Merrienboer, et al. (2002) recommended the 4C/ID Model (Four-Component Instructional Design) to organize complex tasks. The four components of 4C/ID cover: (1) learning tasks, (2) supportive information, (3) procedural information, (4) part tasks practice. Some of the reasons that the 4C/ID model can improve the performance of the transfer task (van Merrienboer, 2002) are: (1) the 4C/ID model is considered to be qualified to practice a whole-task, (2) the preparation of tasks in the 4C/ID model accomodate the development phase of learning, (3) the tasks are designed by considering the various ability of the learners, (4) the whole-task practice allow each learner to enhance his development of rich cognitive schemata as the basis for the transfer of knowledge in the real world.

INSTRUCTIONAL DESIGN

Instructional design is an instructional experience and technology tocreate learning environments to promote learning activities (Merrill, 2006). According to Reigeluth (1983:4) instructional design is a discipline related to the understanding and improvement of one aspect of education. It also relates with the understanding, improvement and application of learning methods.

A New definition of instructional design presented by Gustafon & Branch 2002:17) states that Instructional design is a systematic procedure to develop *eaching and training programs in a reliable* and consistent style. Instructional cesign is a complex process of creativity, activity and ability to be interactive. The complex process of instructional design includes the size, scope and techniques (Gustafon & Branch, 2002: 22). In this case, Spector & Ohrazda 2008:686) stressed the need to automate the complex process by providing in- :epth understanding of complexity. Understanding the new perspectives in the rstructional design means appreciating that the design requires the complexity cocesses in the interaction between elements. This system could bring a very righ complexity and require intelligent behavior (Sims & Koszalka, 2008:578).

Furthermore, it is also stated that learning design represents a collection of complex and challenging task (Spector & Ohrazda, 2008:685). The result of the instructional design as a professional activity is a blueprint architect" of how instruction should be done. This blueprint is a : ascription about what teaching methods should be used to consider the content and learners (Reigeluth, 1983:7). One of the subjects in Faculty of Teacher Training and Education is the activity of Instructional Development Models / IDM (Reigeluth, 1983:7-12). Relevant with the Bloom's taxonomy, the ability to create instructional design is categorized as the cognitive dimension to create which involves preparing the elements needed to be in a coherent whole and reorganizing the elements into a new pattern or structure.

Creating includes: (1) formulate: the process of describing the problem and making choices of the hypotheses that meet certain criteria, (2) plan: establish :,ne procedures to complete tasks and (3) produces: constructing a product. Students' ability in creating instructional design will be measured by jsing performance assessment which is used if paper and pencil test could not oe used. The complexity of the ability to create instructional design is reflected by various task of learning from the simple tasks to the complex ones (Gronlund & Waugh, 2009).

The instrument used to measure the students' ability to create the instructional design is performance assessments that focus on the quality of the product. Some of the reasons for using performance assessment that focus on oroduct quality are: (1) different procedures can produce the same quality of a good instructional design, (2) the procedure is impossible to observe because it .vorked together at the same time; (3) procedural steps to create instructional design have been achieved by teacher candidate, (4) The product of the instructional design has a real quality that can be identified and justified from its value (Gronlund& Waugh, 2009). One of the development model of instructional design is given by Dick, Carey & Carey model (2001). This model is suitable for the development of instructional design in history courses, because of the following considerations: (1) it is relevant with the major characteristics of the design process of learning (Gustafon& Branch, 2002), (2) structure of knowledge in the subject of history is concept and procedures, (3) based on multi-theory which suggests to optimize teacher candidate to create their unique instructional design process as the solution of specific problems and specific situations that they have (Lohr, 2006).

THE ROLE OF PART TASK AND WHOLE TASK TO REDUCE COMPLEXITY IN DEVELOPING INSTRUCTIONAL DESIGN

The part-task approach is an instructional approach that applies an atomistic approach. In this approach, complex content and tasks are reduced into simpler elements to reach a level where the distinct elements can be taught to the learners (van Merrienboer & Kester, 2008:442). This approach decomposes material into elements that are simpler so that mastery of each element can be achieved by the learners (van Merrienboer et al., 2006; vanMerrienboer, et al., 2008).

This atomistic approach focuses on breaking down complex domain knowledge into skill components which are distinguished based on separated learning objectives. Some experts such as: Gagne and Briggs (1979), Landa (1983) and Scandura (1983) state that learners are limited in being able to hold more than one goal in mind at the same time. The basic assumption is that complex learning has many purposes, such as: considering the fact, using the procedures and understand the concept. It is not easy to be achieved by the part-task approach. Therefore, a kind of learning objective, likes learning hierarchies are often used to integrate the components (see Gagne, 1968,1985).

The next development in the early 1990's is proposed by Gagne and Merrill who identify the need to integrate the multiple elements. Several goals must be combined into an integrated one. They hope that learners can deal with the complexity without losing sight of the essential parts. In line with this context, van Merrienboer (1992) argues for the whole-task approach. Whole-task approach is a holistic instructional approach in which complex contents and tasks are analyzed in term of the coherence of the whole and taught from their simplest, yet still meaningful version, towards increasingly more complex versions (van

Merrienboer&Kester, 2008:442). Learning in the context of the whole task approach (van Merrienboer, et al., 2006) consists of Roessingh, et al. (2002) develop test models to determine the optimal schedule training time, among the few combined training. The result shows that by using the whole-task approach, the teacher still has 50% of the training time that can be used to maximize the students' performance. Pollock et al. (2002) compared the combination of learning approaches (the practice of part-task and whole-task approach) and the results show that whole-task approach is better than part-task approach.

In general, several studies have shown that the principle-centered learning tasks can create learners' awareness of the specific structure of information that helps them summarize the information, remember them and use the information more effectively. Besides, learners are found to be able to organize information better, summarize the information obtained, and compare the new material the get with the prior ones. Yet, All these activities require some processes in helping the learners develop and strengthen their cognitivestructures. Furthermore, Roessingh, et al. (2002) also found that the whole-task approach has more capacity in this process and it makes possible to connect the elements of information. Therefore, it can create a scheme of higher quality than the cognitive part-task approach. In accordance with this study, Leberman, et al. (tth.), states that in general the transfer of learning occurs when knowledge and skills previously learned give influence on new knowledge and skills learned and accomplished. Transfers will show a positive thing if the acquisition and performance are facilitated, and otherwise is negative if they are obstructed. Transfer of learning is one of the most common learning phenomena that affect the whole learning behavior in the form of very complexinterconnections.

There are several reasons why transfer of learning occurs (Leberman, etal., tth): (1) the awareness that the transfer is a key concept in learning and isassociated with the process and outcome. This helps us processing, recalling, and improving the information obtained, (2) in the era of globalization, technological excellence and the increasing interdependence among individuals are increasingly necessary, as it increased knowledge and emphasized our need to process transfer of information and ideas, (3) the willingness of the trainees and workers on the transfer process, (4) There is an increasing accountability and evaluation systems. The forms can be categorized into the transfer, the transfer of positive and negative transfer. Positive transfer occurs when learning rises indicators of learning. Moderate Negative transfer occurswhen previous learning or experience impedes the learning process or a newperformance. According to Geusgens, et al. (2007) measurement of the transfer can be classified into 3 groups, i.e. (1) items of non-training, (2) standardized daily tasks and (3) everyday life.

In line with efforts to facilitate the acquisition and performance transfer, the creation of learning conditions and preparation of the task is very important. Kirschner, et al., (2009c) examined the different effects of individual's complexity task and group learning. Research results showed that there is no effect of learning conditions on performance. The primary effect of complexity task did not produce significant differences between the conditions of individual learning and group learning. There is a significant interaction between learning conditions and complexity task. Further, the effect of complexity learning tasks both on the learning process as well as on the efficiency of the process and learning outcomes in individual and group learning is studied by Kirschner, et al., (2009a). The results showed that there is no difference in the effect of individual and group on complexity of learning tasks (low and high). However, there is a significant interaction between learning conditions and complexity task. Thus, Learning conditions affect learning performance. Interaction between learning conditions and task showed a significant interaction.

CONCLUSION

Part-task is atomistic approach focuses on decomposing complex domain knowledge into skill components which are distinguished based on separated learning objectives. Whole-task is a holistic approach in which complex contents and tasks are analyzed in the coherence and are taught from their simplest, yet still meaningful, version towards increasingly more complex versions. Whole-task is designed to prepare learners to have flexibility in adapting themselves to the new problem and new situations. Several studies have found that part-task approach is less suitable for learning complex cognitive skills, because there are many constituent skills and is very effective to reduce task difficulty but they hinder integration of knowledge, skills, and attitudes and limit the opportunities to learn to coordinate component skills. Whole-task models are better suited to learning to coordinate component skillsand are preferred for tasks with a high level of organization. To deal with task complexity, simplification of the whole task and giving learners support and guidance are useful approaches.

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