

A study of the elements constituting online learning activities and their contents

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Abstract

As a focus of research in the field of distance education, online study activities have attracted more and more attention among educational researchers and practitioners. Outcome-based teaching theory is a representative educational theory used widely in recent years in the field of adult education. It emphasizes that study activities are the core of the learning process, and attaches importance to consistency among all aspects in the process of instructional design – which is called constructive integration. It has provided an important theoretical foundation for the study of online learning activities. The present study takes outcome-based teaching theory as its foundation and cases of online learning activities as the objects of study, and uses the methodology of observation and grounded theory to carry out an inductive analysis of online learning activities. The study finds that task, setting, tutorial support, and evaluation are the four basic elements that constitute online learning activities, and that each constituent element includes specific content. The author hopes that the findings of this study will be of assistance in constructing theory for the design of online learning activities and in guiding the practice of such design.

Keywords: Online teaching, Learning activities, Instructional design, Outcome-based teaching.

Background

People's initial acquaintance with online learning can be traced back to the 1960s, with the first distance learning system called PLATO (Programmed Logic for Automatic Teaching Operations). As a distance learning system composed of a large-size computer connected through an information communication network to many terminals, PLATO gradually realized the use of a multi-media format for the presentation of teaching content, for allowing learners to set their own pace of learning, recording the learner's progress, and giving positive feedback regarding the interaction between the learner and the computer. It was even possible to realize interchanges among different PLATO users (Miao Fengchun, 2005). With the steady rise in the level of information technology within society and the demand for learning among the general populace, online learning came

gradually to be understood and accepted by more and more people beginning in the 1990s. The vigorous development of the Internet industry beginning in the 1990s brought unprecedented prosperity to the field of online learning, and online learning programmes were implemented in developing and developed countries both in the continuing education divisions of tertiary institutions and in commercial organizations offering vocational and professional training. Subsequently a number of educational organizations using the online learning model, most prominently “New York University Online” and “British Universities Online”, ended in failure (Zhang Weiyuan, 2005). At the present time, the nature of the laws that govern online learning have become a continuing topic of concern and reflection for those distance learning organizations that have managed to survive the repeated trials.

Literature review

The study of online learning activities has presently become a research field attracting considerable attention in the realm of education, and in both China and abroad more and more organizations are involved in this field. Among universities worldwide, a considerable number of institutions have already established curricula based on online learning. In China, with the increasing penetration of the application of information technology in education and teaching, online learning is in the process of becoming integrated into traditional teaching — even causing changes in traditional teaching. Especially in the realm of higher education, tertiary institutions nationwide that launched pilot projects in online learning are drawing upon the academic credentials education model that has been opened up by online learning, changing people’s concepts about how we receive education. Based on the demand for raising the quality of online education, there is an urgent need for studies relating to the design of online learning activities. At present, research concerning the constituent elements of learning activities is mainly built upon the results of studies following two different paths; that is, either research based on classical theory, or research based on the summarizing of experience.

Top to bottom studies of the constituent elements

The representative research analyzing the constituent elements of online learning activities based on classical theory is that done by David H. Jonassen. In *Reviewing activity theory: The Student-Centred Learning Environment Framework as Design*, Jonassen used activity theory as a framework for describing the elements in the constructivist learning environment and their mutual relationship (喬納森 (Ed.), 2002). The constructivist method of designing learning environments, based on activity theory, is established on the basis of an analysis of the various elements

included in activity theory. Yang Kaicheng's research also uses a top-to-bottom path of study, holding that a learning activity in the complete sense is composed of elements that include the learning objective, the activity task, the mode and method of learning, the operational steps, the form of organization, the mode of interaction, the form of learning result, the rules of supervision of the activity, the designation of roles and responsibilities, the rules of learning evaluation, and the standards of evaluation. Yang also defined the precise meaning and scope of each of these elements, explaining for instance that the form of learning result refers to a certain achievement entity produced in the process of the learning activity and after its conclusion, as well as the form that entity takes, such as a report, a table, a physical model, a formula, among others (Yang Kaicheng, 2004).

Bottom to top studies of the constituent elements

Unlike research on the constituent elements in online learning based on classical theory, research on the constitutive factors in online learning activities based on the summarization of experience starts out from the already-existing practice of online learning activities, applying the "bottom to top" method to continually extract and refine the constitutive elements of online learning activities. The typical representatives of his kind of research are the Dialog Plus research project assisted jointly by the National Science Foundation (NSF) of the United States, Britain's Joint Information Systems Committee (JISC), and the IMS's research on learning design norms. The Dialog Plus research project holds that learning activities include the following three aspects, as shown in Figure 1 (Conole & Fill, 2005):

1. The context in which the activity occurs, including the academic discipline, the degree of difficulty, the expected learning outcome and the environment in which the activity occurs. The learning outcomes, following Bloom's classification, are distinguished into cognitive, aesthetic, and psychomotor fields.
2. The methods of learning and teaching employed in the teaching process, following the three categories proposed by Mayes and De Frietas, are distinguished into associative, cognitive, and situative.
3. The task adopted includes the type of task, the technology supporting the task, any related tool and resource, the interaction, the role involved, and the evaluation connected with the activity.

Established on the basis of the results of the Dialog Plus study, the LADiE case — undertaken with the assistance of JISC further revised the constituent elements of online learning — proposed (a) taking the context in which the learning activity occurs (b) the desired learning outcome and the teaching method applied as

Figure 1: Constituent factors in learning activities (Dialog Plus, 2005)

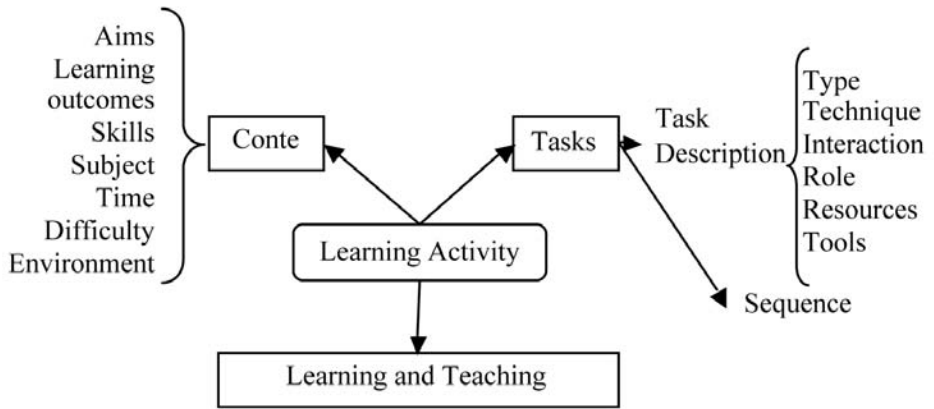


Table 1: Constituent elements in learning activities (LADiE)

Context		Task taxonomy	
Context	Aims Subject Pre-requisites Environment Time Difficulty Skills	Type	Assimilative Information Handling Adaptive Communicative Productive Experiential
		Technique	Assimilative Information Handling Adaptive Communicative Productive Experiential
Learning outcomes	Cognitive <i>Knowledge</i> <i>Comprehension</i> <i>Application</i> <i>Analysis</i> <i>Synthesis</i> <i>Evaluation</i> Aesthetic Psychomotor	Interaction	Who Media Form
		Role	Individual learner, Group leader Coach, Group participant Mentor, Supervisor Reporter, Facilitator Deliverer, Pair person Presenter, Peer assessor Moderator, Interviewer
Teaching approaches	Associative Cognitive Situative	Tools & resources	Hardware, Software Models, Resources
		Assessments	Not assessed, Diagnostic Formative, Summative

the content of the context of the learning activity (c) carrying out a painstaking classification of the task elements that constitute the learning activity, and (d) proposing a classification of learning activities that included type, technology, and form of interaction among the elements identified. The details of the classification proposed are shown in Table 1 (The E-Learning Framework Site, 2008).

Like the Dialog Plus study, the IMS Learning Design Specifications of the IMS Global Learning Consortium Inc., 2009, were used as the standardization organization. IMS published its learning design specifications in January 2003, with the EML of Open University of the Netherlands as the blueprint, stipulating the constituent elements of learning units (as shown in Table 2). This can also serve as reference for study of the constituent elements in the design of learning activities.

Even though the above-mentioned studies of the elements of learning activities all undertook, from different angles, a systematic ordering of the many elements that constitute online learning activities, and considering the various aspects that are included in the process of designing learning activities in a relatively comprehensive way, there are still aspects in which the results of the research are insufficient. Activity theory, as a general framework for understanding and analyzing human activities, constitutes a set of conceptual tools for analyzing, constructing models, and understanding individual and collective human activities; in studies of online learning activities, activity theory has given these studies considerable guidance and inspiration, and it possesses considerable theoretical value and practical meaning.

However, the analytical construction of elements undertaken on the basis of classical theory, while it does embody certain adaptability, has conspicuous problems in two respects. First is that the framework for the construction of elements lacks

Table 2: Constituent elements in the learning units of Global Learning Consortium's learning design specifications

Factors	Context
Learning aim	One or more learning aims
Role	Teacher and learner
Activity	Learning activity and support activity
Activity structure	Activity collection
Environment	Learning objects and service
Service	Service in runtime
method	Play, act, name, role activity, among others

the support of a scientific method of research. Second, it is not able to embody the special nature of the constituent elements in online learning activities. Relatively speaking, the “bottom to top” studies based on the summarizing of experience have better manifested the special nature of the elements involved. However, the existing research results lack sufficient persuasiveness because of the lack of clarity in the research method used. At the same time, taking for example the three elements of task, context, and method identified in the Dialog Plus study, even though three constituent factors in learning activities were constructed, the relationships between the individual factors were not established.

Moreover, the study of the constituent elements done by the LADiE project, which was based on the results of the Dialog Plus project, ended up identifying a collection of individual factors that is overly unwieldy and complicated, unable to satisfy the requirements of designing online learning activities. Overall, within the existing categorization of learning activities, whether it is the top to bottom studies of constituent elements based on classical theory, or the bottom-to-top studies based on the summarizing of experience, to some extent they all embody a lack of support from a scientific research method, a fact which is concretely expressed most typically either as an overemphasis on the perspective of technological construction or as a lack of the characteristics required of a constituent element of learning activities.

The present study takes outcome-based teaching theory as its basis, and it is grounded on the detailed analysis of a large quantity of particular cases of online learning activities. Through an inductive analysis of samples of learning activities, it endeavours to discover the many constituent elements that constitute online learning activities. The results of this study have major significance both for constructing theory to guide the design of online learning activities and for the actual practice of carrying out such design.

Outcome-based teaching theory

Outcome-based teaching theory is a kind of teaching theory and pedagogy that emphasizes the learning outcomes of the learner during the learning process. Its originator J. Biggs remarked that while conventional teaching adopts lecturing and demonstration to deliver the contents and related to this is the acceptance level of the teaching contents, outcome-based teaching theory stresses that teaching begins with a clear description of the learning outcomes. Accordingly, the teacher must meticulously define the intended learning outcome, choosing learning activities and designing relevant assessment tasks to assess learners on applying knowledge from the academic and professional scope on problem solving. (Biggs, 2003)

Biggs used the phrase “constructive alignment” to express the coherence of the learning process; specifically, learners completed the constructive meaning process through learning activities. It is necessary to continually maintain the co-ordination of the various elements in the learning process, particularly the co-ordination among learning activities, evaluation tasks, and learning outcomes. The study of the design of online learning activities, similarly, requires studying the co-ordination among the various elements; at the same time, because the learning activities consist of many elements, co-ordination among the elements is also an essential way of assuring the co-ordination among learning activities, evaluative tasks, and learning outcomes. Therefore, a teaching theory that is based on learning outcomes is an important theoretical foundation and practice of the study of online learning activities.

The aim of the study

The purpose of the present study is, through a thorough and meticulous analysis of a certain quantity of representative online learning activities comprised in online learning, to induce the constituent elements of online learning activities. Concretely speaking, it includes the following two stages: the first is ascertaining what elements constitute online learning activities, and the second is clarifying the concrete content of these elements.

Method

The present study adopts the main concepts of outcome-based teaching theory to investigate the coherence among the various elements in the process of analyzing the elements of online learning activities. The observation method and grounded theory constitute the principal research methodology applied in the study. Through observation, cases of online learning activities were selected, and then through the description of the selected cases a basis was provided for inductive analysis according to grounded theory. Through applying a series of inductive formulae taken from grounded theory, concepts were extracted from the selected cases and these were categorized to form the constituent elements of online learning activities and the concrete content of each constituent element. Through observation and the application of the inductive formulae of grounded theory, the present stage of the study selected and described 84 samples of online learning activity as the foundation of the study. The statistical classification of the study sample is given in Table 3.

Table 3: The study sample of learning activity constituent elements

		No. of Sample
China Online Education National Elaborate Courses	2007 National Elaborate Courses	14
	2008 National Elaborate Courses	27
Peer Coaching Programme		27
"Research Methods in Distance Education" Online Course		16
Total		84

China online education elaborate courses

The China Online Education Elaborate Courses is an important component of the "quality engineering" implemented by China's Ministry of Education, as well as an important fruit of the pilot project work in modern distance education undertaken in colleges and universities that represents the existing level of the development of online courses in China. Through a thorough and detailed study of a certain quantity of representative online learning activities included in the online education elaborate courses, we can induce the present state of the design of online learning activities in China's current online education, reflecting the ideals and achievements of online learning activity design at its present stage of development.

Peer coaching programme

The peer coaching programme is a learning programme for the professional development of school teachers that was developed, designed, and implemented by the Puget Sound Centre under commission from Microsoft. Its overall aim is to raise the effectiveness of teaching through technological teaching integration, to help teachers successfully integrate information technology into the classroom. As a training course in the methods of integrating face-to-face teaching and the internet, its online learning activities are an important component of the course, and the whole training process encompasses many types of learning activities, such as video analysis, curriculum development, problem solving, collaboratively planned courses, guidance carried out in different identities, and so on.

"Research Methods in Distance Education" online course

The "Research Methods in Distance Education" Online Course is an online training course offered jointly by the School of Professional and Continuing Education

of the University of Hong Kong and the School of Medical Online Education of Peking University. The design idea of this online course centres on online learning activities, and the course completely utilizes the online teaching mode. Students use evenings and weekends for their study, and through studying with the aid of meticulously designed autonomous learning materials and the method of online interaction and exchange, they systematically learn the theory, design, and methods of studying distance education. The learning activities involved include watching teaching videos, reading study materials, and internet exchange discussions.

Findings of the study

This study found that online learning activities can be understood as consisting of four constituent elements, namely: the task that targets a specific learning result, the setting in which the learning activity occurs, coaching support directed toward the learning activity, and the evaluation of the learning activity.

The task that targets a specific learning outcome

The task is the crucial element that constitutes a learning activity, the carrier of the learning objective and the concrete task that the learner must complete, and on the basis of task design the learner gradually completes the construction of meaning with regard to the learning objective. Through analyzing the relevant concepts in online learning activities, the task is composed of three aspects of content: the task objective, the task type, and the task sequence. A concrete description of each content aspect as well as examples is shown in Table 4.

Table 4: The content of constituent elements of the task

Element	Content	Description	Example
Task	Task objective	Targets a specific learning result	Points of knowledge or problems to be solved.
	Task type	The task type is the category of the many methods of achieving the objective.	Assimilation task, information processing task.
	Task sequence	The logical relationship among many tasks.	Gradual progression sequence, choice sequence.

The setting where the learning activity occurs

Online learning activities must occur in a specific setting, which is composed of the elements of setting sequence, role, resources, and the technological tools. That the present study uses “setting” rather than “context” to express the specific environment in which the learning activity occurs is mainly because “setting” is more concrete, whereas “context” normally includes the academic field, the learning level, prerequisites, the background, channel and environment of learning and teaching, the learning skills, the time required for evaluation and for completing the activity, while “scenario” is only directed at the pre-set task, normally including content such as role, resources, and tools. A concrete statement of each item of content with examples is given in Table 5.

Table 5: The content comprised within the constituent elements of the scenario

Element	Content	Description	Examples
Scenario	Setting sequence	A series of settings that target the same objective	Setting design within a learning activity management system
	Role	The scope of different responsibilities taken on by the participant in the learning activity, suitable for the teacher and learner.	An independent learner, or a small group of participants or referees
	Resources	Simple or complex learning article	A web page, a single database, a video media flow, an interactive map
	Tools	Promoting application	Search engine, discussion board, trial balance table software, media player

Coaching support directed toward the learning activities

The necessary coaching support is an indispensable constituent element in online learning activities. The content that composes the element of coaching support can be boiled down to three aspects: progress support, rule support, and interpersonal interaction support. A concrete description of each with examples is given in Table 6.

Table 6: The content included in the constituent element of coaching support

Element	Content	Description	Examples
Coaching support	Rule support	The behavioural norms and pertinent suggestions given based on the level of the learning activity system.	Rules of evaluation, rules of exchange, rules of group division.
	Progress support	Assisting the learner in implementing time management.	Record of the path that the learning has followed.
	Interpersonal interaction support	An important means of realizing learning support for the distance learner	Non-synchronized discussion exchange, synchronized video conferencing

Evaluation of learning activities

Evaluation is the judgement regarding whether the learner has achieved the intended learning result. Only on the basis of an evaluation of the learning result is it possible to formulate appropriate revisions in the design of the learning activity and the other constituent elements within the process of the learning activity's implementation, such as the design of the tasks, the design of the setting, and the design of coaching support. Accordingly, the evaluation of learning activities is a judgement regarding the current process of the activity and its results. It is a necessary basis in reality for initiating follow-up activities. Only on the basis of the evaluation of the degree to which the learner has completed the learning activity; that is, evaluation of the results of the learning, is it possible to conduct evaluation of the quality of the activity design and the design of follow-up activities.

Table 7: The content included in the constituent elements of evaluation

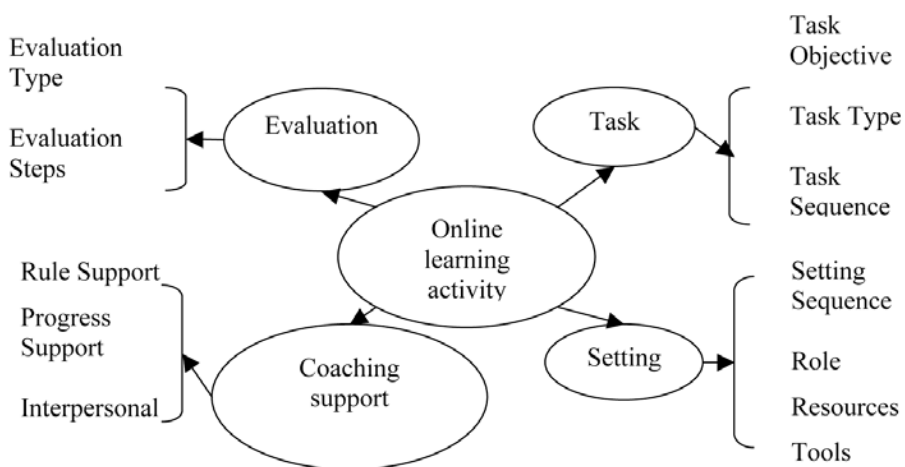
Element	Content	Description	Examples
Evaluation	Evaluation Type	An expression of the kind of mode one chooses to make a judgement regarding the expected results	Self-evaluation, evaluation by others
	Steps of Evaluation	The flow-path in the process of implementing evaluation.	Normally one sets the steps of evaluation according to the sequence of tasks.

As stated above, online learning activities are composed of four constituent elements, including task, setting, coaching support, and evaluation, and each constituent element includes specific content.

The constituent element “task” includes three items of content: the task objective, the task type, and the task sequence. The constituent element “setting” includes four items of content: setting sequence, role, resources, and tools. The “coaching support” element includes three items: progress support, rule support, and interpersonal interaction. The “evaluation” element includes two items of content: evaluation type and evaluation steps. Each item of content is expressed as a different attribute within the concrete online learning activity: for instance, “role” includes learner and teacher and can also be further refined in relation to task type and setting type; “rule support” includes things like rules of discussion exchange and rules of organizational management, and it also includes things like the group-division rules within cooperative learning, and so on. Online learning activities are, then, composed in common of the four large categories of constituent elements listed above, twelve items of content, and a certain number of attributes to which these items correspond, as shown in Figure 2.

The design for learning activities is often reflected as the design for task, and the learner’s post-learning activities involved specific outcome-based tasks, including acquisition of information, initiation of interpersonal communication, and evaluation, among others. Hence, task is one of the four key factors that formulate online learning activities. Among the three aspects of contents of the constituent tasks, there is a direct relationship between the task type versus the role

Figure 2 : Frame of constituent elements in online learning activities



in the setting, resources, and tools, and also the content of the coaching support. The task sequence is direct evidence of the gradual base of the setting sequence and evaluation; the task objective directly determines which type of outcome of the one being evaluated.

The need for further studies

The study of online learning activities has developed in accord with people's continually-expanding understanding of the meaning and regular characteristics of online learning, and speaking from this angle, our present understanding of online learning activities is only in its early stages. Accordingly, for quite a period in the future, the study of online learning activities will become a focus of research within the field of distance education. Further research regarding the design of online learning activities, and the improvement of such design, can concentrate on two aspects: (a) how the twelve concrete items of content included under the four constituent elements are concretely expressed within different learning activities, and (b) the mutually adaptive relationships among these concrete items of content.

References

- Biggs, J. (2003). *Teaching for quality learning at university* (2nd ed.). The Society for Research into Higher Education, Buckingham, UK: Open University Press.
- Conole, G., & Fill, K. (2005). A learning design toolkit to create pedagogically effective learning activities. *Journal of Interactive Media in Education*, (8).
- IMS Global Learning Consortium Inc. (2009). *IMS learning design specification*. Retrieved December 9, 2009, from <http://www.imsglobal.org/learningdesign/index.html>
- Open University of the Netherlands. (2009). Learning networks. Retrieved November 9, 2009, from <http://www.learningnetworks.org/?q=EML>.
- Teaching and Educational Development Institute (The University of Queensland). (n.d.). *Biggs' structure of the observed learning outcome (SOLO) taxonomy*. Retrieved February 4, 2008, from http://www.tedi.uq.edu.au/downloads/biggs_solo.pdf.
- The E-Learning Framework Site. (2010). *The e-Learning Framework*. Retrieved February 25, 2010, from <http://www.elframework.org/refmodels/ladie/>.

苗逢春 (2005) 《資訊技術在教學中的應用發展簡史》<http://www.nrcce.com/nrcce_bbs/viewthread.php?tid=64&fpage%20=4>(2009年 3月26日讀取)

喬納森主編，鄭太年等譯 (2002)，《學習環境的理論基礎》。上海：華東師範大學出版社。

楊開城 (2004) <論教學設計理論研究的一種範式和兩種取向>，《中國電化教育》，第3期，第15–18頁。

張偉遠 (2005) <國外高校網上教學成功和失敗的原因剖析>，《中國遠程教育》，第11期，第32–35頁。

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