CONSTRUCTIVISM AND E-LEARNING: BALANCING BETWEEN THE INDIVIDUAL AND SOCIAL LEVELS OF COGNITION

David Hung & Maish Nichani
National Institute of Education
Nanyang Technological University
Singapore

Abstract: In current literature, there are many interpretations of constructivism – from the radical views individualistic cognition to the other side of the continuum where mind is simply social in orientation. In essence, we argue for a balanced and pragmatic view of the mind bridging both the individual and social levels of cognition – balancing between Vygotskian and Piagetian views. From such a perspective, we propose the design of e-learning environments where both personalization of learning (individual) and affiliations to the community of learners (social) are complemented. Both a collective and individual understanding of knowledge and meanings are important.

Introduction

Constructivism has been a dominant epistemology gradually replacing the objectivist and positivist paradigm in the last one to two decades. Constructivism, like objectivism, holds that there is a real world that we experience, however, the argument is that meaning is imposed by our interpretation (or meaning-making) of the world. There are many ways to structure and interpret the world, and there are many meanings and perspectives for any event or concept. Hence the constructivist view is opposed to the one correct objectivist meaning that we strive for (Duffy & Jonassen, 1992).

The purpose of this paper is to clarify the main 'faces' of constructivism and to formulate a possible working constructivist framework for e-learning. Having balanced the individual and social perspectives to constructivism, we recognized that e-learning environments should be situated in both the social community of teaching practice and in the individual minds of students.

Constructivism – Balancing the Individual and Social Perspectives

The two dominant roots of constructivism are the radical constructivist and the social-cultural views. Arising from Piaget and von Glasersfeld is the radical constructivist view where learning is defined as a predominantly individual self-organization of the mind – an active cognitive reorganization through processes such as assimilation, accommodation, and equilibrium. The social-cultural view, on the other hand, argues that mind is a by-product of external culturally organized phenomena such as practices in the context of artifacts, tools, and language. Such a view is attributed to Vygotsky, Leont'ev and other Marxist orientations. Recent notions such as cognitive apprenticeship, legitimate peripheral participation, or the negotiation of meaning in stipulated construction zones are notions arising from the social-cultural perspective.

It is important to realize that proponents of the above two views did not deny the presence of either the social or individual dimensions. For example, although von

Glasersfeld defines learning as self-organization, he attributes this constructive activity as the cognizing individual who interacts with other members of the community (Cobb, 1994). von Glasersfeld elaborates that *knowledge* refers to "conceptual structures that epistemic agents, given the range of present experience within their tradition of thought and language, consider *viable*" (1992, p. 381); and contents that "the most frequent source of perturbations for the developing cognitive subject is interaction with others" (1989, p. 136).

In the same vein, the social-cultural view as dominated by the Vygotskian perspective also did not deny the individual view. The oft-quoted Vygotskian cultural law of development emphasizes the view of *internalization* from the social intermental to individual intramental level. However, there still remains much research on how this internalization process from then social to individual occurs. The Vygotskian view claims that cognition begins at the social level – social interactions, situated contextual practices, signs, tools, etc. – yet there is now ample evidence from Piagetian and neo-Piagetian studies that young children work out a substantial knowledge of the physical world, well before they could have gained much of it from the surrounding culture (Carey & Gelman, 1991). In other words, social learning plays a significant role, but it cannot be said that all of conceptualization and learning must originate from the social plane.

Stripped to their essentials, constructivism tells us to pay close attention to the active learner's mental activities (organization of his / her mind) and social-culturalism tells us to pay close attention to the cultural practices of the learner's milieu. Except for the practical difficulty of doing both at once, there is nothing incompatible in these two proposals. Neither one rejects the other. Thus, from a pragmatic point of view, we should consider what the two perspectives have to offer. *Learning should be a process of active individual construction and a process of enculturation into the practices of the social society*, of which, the immediate wider society of our trainee-teachers is the teaching community.

Brown and Duguid (2000) elegantly describe learning as demand driven, a social act, and an identity formation. By demand-driven, the learning context should create the active need for reorganization of cognitive processes; by social act, learning is embedded in the larger community beyond the individual; and by identify formation, learning creates the personality of the learner affiliated to the community of practice – for example, the teaching community – through internalization and appropriation of knowledge, skills, beliefs, and norms. These terms are similar to the ASK model where the emphases are on Attitudes, Skills, and Knowledge. Attitudes are acquired through appropriation of exemplary behaviors, and skills through the internalization and application of knowledge. The ASK model complements both the constructivist (internalization) and social-cultural (appropriation) perspective.

Finally, in comparing the two views, it can be noted that the social-cultural view as enculturation via guided participation (for example within Vygotskian notion of the Zone of Proximal Development) assumes an active constructing learner. Conversely, the constructivist view of learning as cognitive self-organization implicitly assumes that the learner is participating in cultural practices. In effect, active individual construction constitutes the background against which guided participation in cultural practices comes to the fore for the social-cultural view, and this participation is the

background against which self-organization comes to the fore for the radical constructivist view.

Each of the two perspectives tells us what we should do in our instructional and learning 'story' and they can be used to complement each other. For example, a young newly trained teacher gets encultured in the school practice and acquires all the rules of the cultural practice as he or she progresses from a novice learner to a mature teacher-practitioner – the strengths of legitimate peripheral participation through observations and guided participation. On the other hand, the newly trained teacher reflects upon what he or she had learned and encounters self-reorganization – refining her theoretical knowledge in relation to his / her practical experiences. In this regard, there is a need for a similar culture in terms of norms and practices (for example the constructivist practice) between institutions and schools. Otherwise we may not be fostering the creation of a teacher-identify in real practice.

In the next half of this paper, we illustrate a practical approach to this complement of the individual and social perspective of constructivism through the design of two models of e-learning. The first model is the traditional instructional cum learning approach where we complement the best use of media to facilitate both the individual and social process; and the second approach is a newer and more exciting direction of e-learning environments focusing on personalization (individual) and its relationships to the larger community of practitioners (social).

E-Learning – Complementing the Individual and Social Perspectives
Model 1
In the first approach for e-learning (Model 1), we fundamentally compare the strengths and weakness of different media types (for example, the Internet, the text book, the classroom, etc.) and ask ourselves how we can deliver instruction in the most effective manner complementing the use of the different media for the learner. How do we use the different media types to ensure that self-organization and appropriation of knowledge from social others' occur? We refer you to a working paper at NIE – *The Pedagogical Design of IT Integration in On-Line Learning: A Case Study of an Instructional Technology Module.*

In this Instructional Technology module, we combined a text-book cum web site (*Blackboard CourseInfo* system) approach where we recognized that the text-book readings (no mass lectures) provided the knowledge content for instructional technologies integration into subject curriculum. The Blackboard web-site provided on-line activities (which can be updated according to different cohorts) in complement with the text-book readings (the best way we envisage to engage in reading text). These on-line activities, such as quizzes and tasks to be accomplished, assist in the internalization of knowledge resulting in integration skills for the training-teachers. A large component of the on-line activities involve on-line discussions where students socially interact and discuss on issues relating to the readings from the text-book. In essence, the students discuss pertinent issues relating to IT integration in the context of the school culture and practice (see Figure 1).
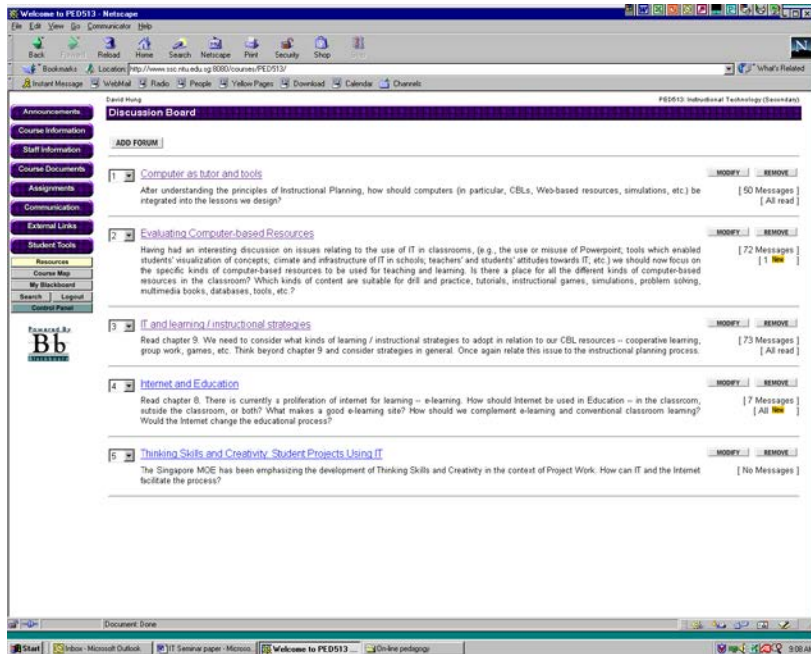
Figure 1. Discussion Forums

These on-line activities are to be seen in the context of two larger projects that must be accomplished by the students. These two projects are done out-of-class time and within tutorial consultation sessions. The students work in pairs for their projects and in the facilitation of the on-line discussions. In essence, the projects attempt to also foster a social collaborative process where the tasks given to the students would be of relevance to the larger school community, and through the collaboration, actual practical integration and creation of IT resources would facilitate the internalization of skills and knowledge.

Fundamentally, we felt that since the web is dynamic and updating of information and activities is facilitated we put information and materials which were "fluid" on the web, for example, what students needed to do each week (see Figure 2).
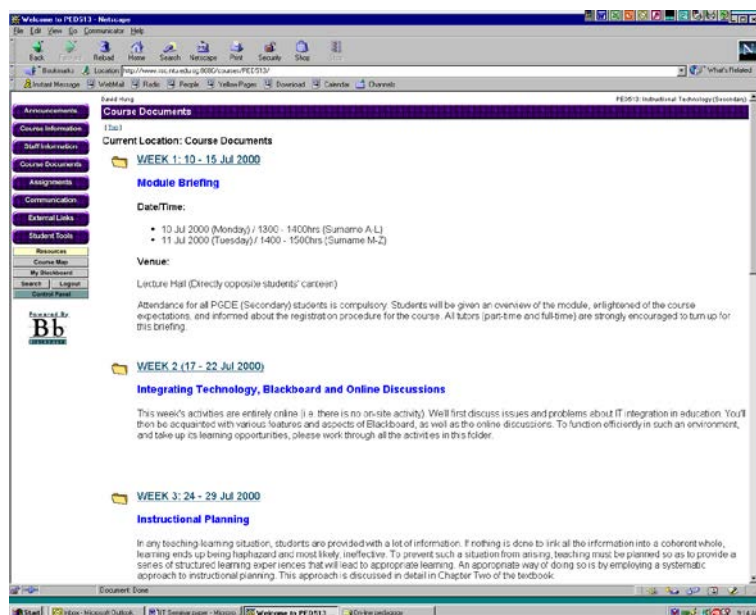

Figure 2. Weekly Activities

Model 2
In the second approach to e-learning (Model 2), we leverage on the concept of *personalization* as it is being used in e-commerce models, and try to map it onto an e-learning model. Personalization as a means of catering to individual consumers needs and wants, has long been touted as one of key benefits of the Web (Stellin, 2000). Because of its wide acceptance as a powerful marketing tool, it alternatively described in some circles as "one-to-one marketing", or "targeted merchandizing". But this concept of personalization also exhibits some of the characteristics of key learning issues raised by the likes of Jean Lave, Etienne Wenger, John Seely Brown, Paul Duguid, Donald Norman, etc. In this approach, we hope to distill some of these characteristics and incorporate them into an e-learning model.

Any of us, who has visited websites like Amazon.com (www.amazon.com) and CDNow (www.cdnow.com), or more so, who have bought some products from these sites, would immediately recognize a type of personalization at play. This type of personalization, that is usually referred to as "recommendation systems" by these sites, works something like this: If customer-1 bought items A, B C and D, and customer-2 bought items A, B and C; then it is quite probable that customer-2 might like item D also. If this is the case, then the personalization engine recommends item D to customer-2. But this is as easy as it gets. Personalization engines are built around complex mathematical algorithms that scan through thousands of customers buying and browsing habits, and then try to match them up with a particular customer's profile. As these complex algorithms are called "collaborative filters", this type of personalization also known as "collaborative filtering-based" personalization.

In another type of personalization, known as "rule-based" personalization, customers are required to make their likes and dislikes known beforehand, by filling up a certain "profile-forms". When, for example, a customer specifies that he/she would like to get health news or financial news, then the website satisfies this customer's need by providing content and services related to health and finance only.

Analyzing the above two methods, one cannot fail to recognize the similarities with the social (collaborative filtering) and individual (rule-based) characteristics of learning that were discussed above. Collaborative filtering-based personalization systems help to expose an individual to a related community. For example, it may not have been possible for a customer to know about certain books in Amazon.com if it were not been recommended in the first place. By recommending book titles read by a particular community or group, the recommendation system tries to suggest a community or group to which an individual might belong. And when a customer discovers his/her affinity to a particular community or group, then he/she can indulge in similar reading habits of other members of the community. In Lave & Wenger's terms, the customer got an opportunity to get enculturated with the practices of his/her community (Lave & Wenger, 1991). It is this ability to enable enculturation that makes personalization a promising candidate for inclusion in learning environments— be it corporate learning environment, or a university environment.

But before we can describe personalization's role in such environments, we have to clarify an important point. The reason why personalization is so effective in sites like Amazon.com or CDNow, is because of the fact that these companies carry thousands

or even millions of products, or in other words, they have huge selections. It does not make sense for a company to use personalization systems when it sells just ten products. Thus, for personalization to be effective, having a big selection is a necessity.

But having a selection is not a concern for schools and universities. Information is in abundant supply in the form of articles, lecture notes, presentations, archived thesis and dissertations, etc. And more importantly, information in universities is being accumulated all the time. If all these sources of information are present and made available in electronic forms, as a part of a large database, it will create a very favorable environment through which the benefits of personalization can be leveraged. If such were to be the case, we can paint the following scenario.

Students log onto the university network. Information relating to the courses they wish to take, their previous experiences, their modes of learning, etc. is gathered and their personal profile is created. Rule-based personalization can then be used to target instructional content and media to specific individuals based on their profile. For example, NIE students logging into the system will have personalized views according to their profiles such as BA/BSc, PGDE, Dip Ed, MA-IDT, and others. Rule-based personalization can go many levels deeper by tracking the students' content area expertise, the kinds of information sites usually accessed, the assignments undertaken, the lecturers from various Academic Groups consulted, etc. By keeping a history of the students' activities, the e-learning environment would be able to recommend timely and appropriate resources and materials for the students' learning. It would also be able to recommend directions for the students, for example, possible projects or assignments where the student would most likely be able to be interested in. This can be achieved by the system searching databases both locally and internationally. It could also recommend research areas of interest and associate these areas to special interests groups, which is related to the collaborative filtering-based personalization.

Collaborative filtering-based personalization can be used to guide specific individuals to their most related community or communities by exposing the modules, articles, media that others in the community are viewing or reading. By being able to trace the students' preferences, the e-learning environment is able to associate or affiliate the student to people in the community, such as school teachers, university professors, special interest groups, etc. who have similar preferences. Gradually, an identity with this community is formed. This collaborative-filtering method basically tries to associate the NIE student to other related teacher-educators and collaborators.

Thus, we envisage personalization-based systems to capitalize on the abundant information and knowledge held in universities to target specific individuals with appropriate instructional content and media, as well as enable specific individuals to get encultured with communities to which they display the strongest affinities.

Discussion

From the perspective of both an individual and social constructivist view, we recognize that individual and collective knowledge construction and understanding is important. Certain learning community-based environments primarily emphasis the collective goal of knowledge building, where the objective is to advance corporate

understanding. We are advocating that unless the collective understanding is appropriated or internalized by the individuals in the community, there is only a collective identity formed but not an individual identity. Learning should ultimately occur in the learner's head, and not just at the social level.

In a learning community where individuals count, there must be a process of learning where diverse expertise and perspectives are mutually complemented and valued. In other words, there is a mutual dependency on one another's expertise. Sharing and respect for each other's views are also part of the rules of the community. When knowledge is socially constructed, there are the notions of negotiation and discourse. Learners are encouraged to dig deeply into concepts, overcoming misconceptions and queries for understanding. In such communities, the goals and objectives are clear – learning knowledge and learning how to learn.

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