

# Online Language Learning and Teaching Pedagogy: Constructivism and Beyond

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**Abstract**—In the last two decades, one can clearly observe a boom of interest for e-learning and web-supported programs. However, one can also notice that many of these programs focus on the accumulation and delivery of content generally as a business industry with no much concern for theoretical underpinnings. The existing research, at least in online English language teaching (ELT), has demonstrated a lack of an effective online teaching pedagogy anchored in a well-defined theoretical framework. Hence, this paper comes as an attempt to present constructivism as one of the theoretical bases for the design of an effective online language teaching pedagogy which is at the same time technologically intelligent and theoretically informed to help envision how education can best take advantage of the information and communication technology (ICT) tools. The present paper discusses the key principles underlying constructivism, its implications for online language teaching design, as well as its limitations that should be avoided in the e-learning instructional design. Although the paper is theoretical in nature, essentially based on an extensive literature survey on constructivism, it does have practical illustrations from an action research conducted by the author both as an e-tutor of English using Moodle online educational platform at the Virtual University of Tunis (VUT) from 2007 up to 2010 and as a face-to-face (F2F) English teaching practitioner in the Professional Certificate of English Language Teaching Training (PCELT) at AMIDEAST, Tunisia (April-May, 2013).

**Keywords**—Active learning, constructivism, experiential learning, Piaget, Vygotsky.

## I. INTRODUCTION

WHILE one can currently observe a boom of interest for e-learning in the last two decades and an abundance of web-supported programs and content management platforms, the claims made by the producers of these curriculums and platforms, are usually "not substantiated; they function more for the purpose of promotion and marketing rather than any indication of the platforms' value to teaching and learning" [1]. Knowing the principles of learning has never been as insistent as it is in a virtual environment where the teacher and students are spatiotemporally separated. An online language teaching strategy not based on a sound body of language learning theories is doomed to failure. "It is the theory which decides what we can observe" as Albert Einstein declared, as cited in [2]. Reference [3], long ago, called for the creation and development of a "linking science [... bridging] between theory and practical work". The present paper is going to play this "middle man position" marrying theory to practice by translating relevant aspects of the constructivist learning

theory into optimal online instructional actions. The paper will, consequently, shed light on constructivism key principles, its implications for language teaching pedagogy in general and for online language teaching pedagogy in particular, with a special focus on the educational platform Moodle (Modular Object-Oriented Dynamic Learning Environment), which is an online learning management system (LMS) responsible for online course delivery and interaction. The paper will also uncover some of the potential limitations to be avoided in the e-learning instructional design.

## II. THE CONSTRUCTIVIST KEY PRINCIPLES

An immediate problem arises when defining constructivism, as there is not one constructivism but rather "constructivisms" [4]. Reference [5] states that the term "constructivism" has been frequently used and even overused in the discourse of many sub-disciplines in educational psychology, philosophy, policy, etc.; and the expression "Students should construct their own knowledge" is being "reverentially chanted throughout the halls of many a school/college/department of education these days," counter any passive and rote learning approaches. Hence, as [5] elucidates, "constructivism" has come to serve as "an umbrella term" for a wide diversity of views that could be labelled constructivist, yet neither the space nor the purpose of the present research permits to detail the differences between the many permutations of constructivism. However, two major trends in cognitivism can be marked out: the cognitive constructivism led by the Swiss philosopher Jean Piaget and the social constructivism led by the Soviet psychologist, Lev Vygotsky. Although both men agreed that "learning is an active process of constructing rather than acquiring knowledge" and that "instruction is a process of supporting that construction rather than communicating that knowledge" [5], their view of the tools and manner of construction vary enormously.

Piaget, whose work is most often described as the impetus for the current constructivism movement [6], [7], views that language learning is an intrinsically personal process whereby "meaning is made by the individual and is dependent upon the individual's previous and current knowledge structure," [8] and hence can be considered an "internal cognitive activity" [8]. For this very reason, Piaget's constructivism is often called the cognitive--or sometimes the individualist--constructivism. Piaget's approach to constructivism is a part of a cognitive revolution, and it is not a totally new approach [9]. For [10], [11], individuals construct new knowledge against

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their prior experiences by the help of two basic mental mechanisms: assimilation and accommodation. Assimilation is the incorporation of the new experience into an already existing framework, or as Piaget called Schema, without changing that framework/schema. But when the individuals' new experience contradicts with their internal representations, they resort to a mechanism of accommodation; they adjust their mental models and perception of the world to accommodate the new experience. For instance, babies, who like the act of banging as an enjoyable scheme to explore the world around them, deal with any new object by means of assimilation: They try to bang on the object to produce a noise. However, once they come across a soft object, an egg for instance, they will not find the same result. This unfamiliar situation will be a motivation for learning new information. Therefore, in the future, they will try to accommodate the banging strategy/scheme to fit the requirements of the new information, creating as such a new scheme: probably delicately banging on new objects instead of using their whole force. Accordingly, as [12] deduces, "accommodation can be understood as the mechanism by which failure leads to learning: We learn from the experience of failure, or others' failure."

Piaget broke with the long pre-existent nature/nurture debate about knowledge and language acquisition: whether the latter is a biological-maturation process or an environmental-learning one. For Piaget, as [13] explains:

Nature's role in cognitive development is the biological maturation of the mind making it ready for an organism to assimilate experiences and that the role of "nurture" is the opportunity provided by the environment by presenting novel objects and events that a child can accommodate into his schemata. Thus, without both nature and nurture, there will be no such thing as cognitive development.

The social constructivist view, however, premises that learning is constructed through social interaction and discourse rather than via pre-existing mental schema [14], and is considered to be a process in which meaning is made dialogically [8]. Reference [14] suggests that learning and development take place in the interactions children and students have with peers as well as with teachers and other adults. These social interactions develop language—which supports thinking—and they provide feedback and assistance that support ongoing learning. Although "constructivists of different persuasion (hold a) commitment to the idea that the development of understanding requires active engagement on the part of the learner" [15], Piaget and Vygotsky differ in whether the role of the learning construction is purely individual or collective. Vygotsky, and behind him social constructivism, further extends constructivism into social contexts, "wherein groups construct knowledge for one another, collaboratively creating a small culture of shared artifacts with shared meanings" [16]. Reference [14] argues that through social activities children learnt cultural 'tools' and social inventions. These included language, rules, counting systems, writing, art, and music. The social

constructivist paradigm views the context in which the learning occurs as central to the learning itself [17]. For this very fact social constructivism has been criticized for being a kind of behaviourism, which reduces the individual to his or her social environment. And here lies the major difference between Piaget and Vygotsky.

Although both Piaget and Vygotsky view cognitive development as a stage theory involving active interaction between the individual and their environment, Vygotsky believes that learning is more socially constructed and contextual than Piaget and that parental and teacher support in preparing tasks and experiences slightly beyond what a student would do on his own, called scaffolding, contribute to increased student competence [18]. Scaffolding is a process through which a teacher or more competent peer gives aid to the student in his/her "zone of proximal development" (ZPD), and gets rid of this aid as it becomes unnecessary, much as a scaffold is removed from a building after construction is finished. Reference [14] conceives the ZPD as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers." See Fig. 1 for a schematic diagram of the ZPD.

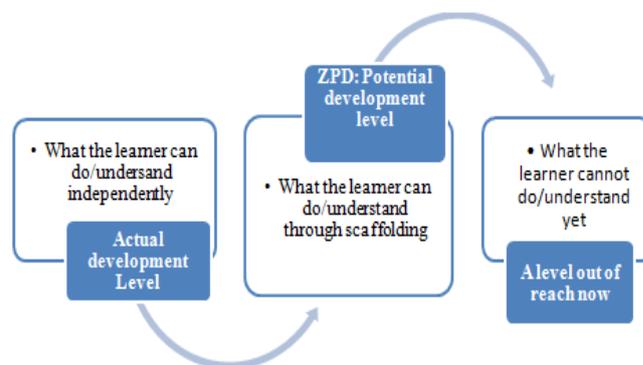


Fig. 1 The zone of proximal development

According to Fig. 1, the ZPD is the area where the most sensitive learning and instruction should occur. The ZPD would pave the way to the learner's future independence in developing meta-cognitive skills. "What the child is able to do in collaboration today he will be able to do independently tomorrow" [14].

Most social constructivist models, such as that proposed by [19], also stress the need for collaboration among learners, in direct contradiction to traditional competitive approaches. J. S. Brown, in most of his writings, suggests that one learns especially well not only when s/he does it in collaboration with others (as apprentices do), but also when s/he thinks of learning as an opportunity to produce and share knowledge rather than to merely consume [20]. For [20], meaningful learning occurs only when individuals are engaged in social activities: understanding is basically socially constructed with others. Reference [21] contrasts Cartesian individual learning, "I think, therefore I am" with "We participate, therefore, we

are” mode of learning. This emphasis on social learning stands in sharp contrast to the traditional Cartesian view of knowledge and learning which assumes that “knowledge is a kind of substance and that pedagogy concerns the best way to transfer this substance from teachers to students” [21]. Reference [21] views that attention should move from the content of a subject to the learning activities and to the human interactions around which that content is situated. This perspective also helps to explain the effectiveness of studying in groups where all learn from all, and where each can take on the role teacher.

### III. THE IMPLICATIONS FOR LANGUAGE TEACHING PEDAGOGY IN GENERAL

Constructivism itself does not suggest one particular pedagogy or “a theory about teaching,” but rather, as [22] affirms, “a theory about knowledge and learning,” an underlying philosophy and not a strategy [23]. Reference [24] also sees that while constructivism is a well-documented theory of knowing, it is not yet a well-documented theory of teaching. However, constructivism, as a description of human cognition, is often associated with pedagogic approaches that promote *active learning*, *learning by doing*, *student-centred learning*, and *experiential learning*.

Reference [25] notes that active learning and learning by doing are important principles that have emerged within the constructivist viewpoint. Active learning is “anything that involves students in doing things and thinking about the things they are doing” [26]. Hence, the learner, according to constructivism, is the centre of instruction; s/he is an active organism “not just responding to stimuli, as in the behaviourist rubric, but engaging, grappling, and seeking to make sense of things,” as [27] postulates. Reference [28] goes further by regarding the learner as “already a scientist” who actively constructs knowing. Reference [29] exhorts that “knowledge cannot be imposed or transferred intact from the mind of one knower to the mind of another. Therefore, learning and teaching cannot be synonymous: we can teach, even well, without having students learn”. In a word, as [30] summarizes, the basic idea of constructivism is that knowledge must be constructed by the learner; it cannot be supplied by the teacher, unlike in behaviourism which places the responsibility for learning entirely on the shoulders of teachers:

Teachers were led to believe that if learning was not occurring, then it was their responsibility to restructure the environment, determine the most appropriate reinforcement to promote the desired student behaviour, or provide a negative reinforcement to extinguish unwanted behaviours.

After years of implementation, behaviourism fell short of producing positive effects within the complex context of the classroom and left teachers feeling short-changed

and cheated by a system that placed the guilt for students' failure to learn in their hands [31].

Part of the constructivism's success may be due essentially to this very frustration that educators experienced with behaviourist educational practices. The constructivist movement has been welcomed as a “refreshing view of learning” [31] that puts the learner at the heart of the learning process, whereby the learner is fully responsible for actively constructing their own conception of knowledge and meaning, following the Farsi proverb wisdom: “A well must produce its own water.” For this wisdom in particular, constructivist-based instruction advocates what [27] calls “discovery learning”, a learning journey where the learner strives to make sense of the world on the basis of personal filters: experiences, goals, curiosities and beliefs [32]. This echoes *experiential learning* principles. As its name suggests, the experiential learning school sees that learning and development occur essentially through the individual learner’s determined experience instead of passively hearing or reading about others’ [33]. Experiential learning stands in sharp contrast to receptive “chalk-and-talk” didactic learning where the teacher writes on a board and speaks while learners listen and take notes.

To make the experiential learning all the more constructive, the instructional designers should produce authentic activities that have real-world application [19]. They should also create learning situations that promote the engagement or immersion of learners in problem-based activities which challenge each student who should be allowed to choose the level of difficulty and involvement which matches their ability at that time and be given enough time and opportunity to reflect at each stage [19]. *Scaffolding* is an effective meta-cognitive strategy to guide the learner from what is presently known to what is to be known engaging them in cognitive processes appropriate for their zone of proximal development [29].

Given at the beginning of a new lesson, a KWL advance organizer, for instance, can be a constructive meta-cognitive exercise. A KWL is “a strategy enabling students to know what they know, what they want to learn, and what they did learn” [34]. A constructivist-based lesson could, therefore, start with students’ discussion of what they know. Then, they are encouraged to make prediction about what they want to learn. At the end of the lesson, they test what they actually did learn. See Fig. 2 for a sample of a KWL chart given by the author to her practice teaching students at the Professional Certificate of English Language Teaching Training (PCELT) (April 22, 2013) as a pre-reading activity for a text entitled “UK Leads World in Mobile Web Use.”

The “KWL” activity proved to be an effective graphic organizer (i) to activate the author’s PCELT students’ prior knowledge about the mobile electronic gadgets to the forefront of their minds, (ii) to identify questions that they will look to answer while reading the text, thereby establishing a purpose for reading and building motivation to read, and (iii) to organize the information learned while reading.

Name: .....



Date: .....

Pre-Reading

## K.W.L. Chart

**Topic: the latest entertainment and communication technology:**

Before reading the article, answer the following questions using only the first two columns of the KWL chart:

1. What are the **latest gadgets** that people are buying?
2. What is the age of people who are **gadget obsessed**?
3. What are the **mobile devices** people now use?
4. What are the most popular things young people **access the internet** for?
5. What is the **leading** country in mobile web use?

K	W	L
What I Already Know	What I Want to Know	What I Have Learned

Fig. 2 A KWL graphic organizer

#### IV. THE IMPLICATIONS FOR ONLINE LANGUAGE TEACHING PEDAGOGY IN PARTICULAR

Reference [5] argues that within a constructivist framework, technology itself could serve as a constructive meta-cognitive tool, for it facilitates the creation of dynamic meaningful learning activities “rather than just a simple redistribution of cognitive labour”. The creation of meaningful activities helps students develop effective ways to understand and, thus, to resolve problematic situations, which fosters their motivation and offers them the “opportunity to experience the pleasure and satisfaction inherent in problem solving” [29]. Reference [35] argues that technology, as a construction tool, can serve also as an enjoyable tinkering tool for it provides the students with a “‘construction kit’ (a set of modular parts with which to make things, as in Tinker Toys with its physical parts or Logo with its computer-command parts)”. The “tinkering”<sup>1</sup> technique is a useful technique mainly in language learning programs where the learner enjoys playing with language.

Moodle contains many tinkering modules such as matching quizzes, multiple choice quizzes, embedded-answer quizzes (cloze style), among others. Moodle can also integrate more interactive web activities created by plug-in applications such as HotPotatoes, an application capable of producing different interactive activities such as crosswords, drag and drop matching exercises fill in the gap tasks, reordering scrambled items and even some web games like image puzzles. Hot Potatoes quizzes could also insert music, narrations and animated images to enrich the testing. Such a multimedia quiz encourages students to use their sense to interpret the words around them. In addition, such a quiz is much more interesting and a good remedy to relieve the nervousness usually associated with F2F testing [36]. Reference [37] believes that a piece of paper can never play video and sound; at most, it can include images, but the printing effects are disappointing

most of the time. See [36] to explore concrete illustrations of some of the above mentioned Moodle ‘tinkering modules,’ used by the author, as an e-tutor of English at the Virtual University of Tunis (VUT) (2007-2010).

Tinkering is one of *learning by doing* techniques. For [25], learning by doing is a key principle advocated by the constructivist school. Dewey was perhaps the greatest proponent of learning by doing. Dewey reacted against the traditional educational framework of memorization and recitation and argued that “education is not preparation for life, it is life itself,” as cited in [5]. Radical constructivists call even for the elimination of standardized curriculum with preset behavioural objectives. They are for an activity-objective curriculum customized to the students' prior knowledge and emphasizing hands-on problem solving [38].

Apart from the meta-cognitive and tinkering tools, constructivist-based virtual learning environments offer a plethora of online learning tools and activities that enhance *communication* and *collaboration*. Moodle learning environment has many features that encourage collaboration and social interactions: (i) Forums, chatrooms, and wikis can be easily setup and monitored; (ii) messages and assignments can be posted, shared, commented not only by the e-tutor, but also by peers; Moodle also has a feature called ‘Groups’ that can be used to create smaller collaboration units within a class.

References [36] and [39] state that constructivist thought could be encouraged through learner participation in structured online discussions, collaborative online activities, online assessment, interactive course material, and the changing role of the teacher from “a sage to a guide”, or coach. Reference [40], too, identifies the importance of *discussion* and *interaction* during the online learning process. Reference [40]’s and [39]’s perspective on constructivism in online learning practices sensitizes the traditional institutions and educators to rethink the concept of the university, in order to invite open critical and discursive learning [41]. Teachers

<sup>1</sup> The word was coined by Huberman in 1995 (see [64]).

should rely heavily on open-ended questions and promote extensive dialogue among students. Therefore, the strategy of active participation in online discussion forums may be seen as a constructivist practice. However, as [42] warns, enforced or coerced participation may have counter effects for it may result in learners either being increasingly physically or mentally absent, "in the sense of not being engaged with ideas, skills and knowledge". *Lurking* or silence in formal online course discussions is usually treated as an unwanted behaviour and lurkers as free-riders and non-contributing, resource-taking members' beneficiaries of others' discussions [43], [44], yet [45] affirms that "lurkers" are actually learning; low visible participation does not imply less engagement in learning. Reference [45] sees that active e-learners may participate at the expense of their reflection time, and it is possible that silent e-learners are more engaged. Reference [46] even argues that lurking "is not free-riding but a form of participation that is both acceptable and beneficial to most online groups." Reference [46] explains that "public posting is only one way in which an online group can benefit from its members" and that "all members of a group are part of a large social milieu, and value derived from belonging to a group may have far-reaching consequences." Consequently, punishing low visible learners on the basis of the number of postings and log-in times is, as Dewey considered, "a denial of democracy and the principles of self-directing individuality," as cited in [47] which online learning has long preached about and called for. Reference [41] assumes that "a pedagogy that rejects silent invisible forms of learning, and sees the need to normalize learning by giving importance to visible behaviours assessed by a teacher in power position, are not only disempowering but also not constructivist". As a solution for this problem, [41] suggests that "for online learning experiences to enable constructivist learning, facilitators of online learning experiences need to enable informal and trustworthy learning spaces, where learners feel confident and supported in working on their own and with each other". Reference [48] highlights that "there is no point to networked learning if you do not value learning through co-operation, collaboration, dialog, and /or participation in a community. One of the main strategies of constructivism--mainly the social constructivism version—is to create collaborative learning environment. Wikis are the best milieu for online collaboration. However, collaborative learning "does not just entail sharing a workload or coming to a consensus, but allows learners to develop, compare, and understand multiple perspectives on an issue" [29]. Learners should be able to explain and justify their thinking and "openly negotiate their interpretations of and solutions to instructional tasks" [49]. Reference [31] views that the social constructivism "focus on the social context and larger community of learners has resulted in a major shift away from individually-based instruction to instruction that incorporates and embeds teaching within the larger community of peers." Students sometimes learn a lot by just observing the activity of their peers [50]. Teachers, today, tend to recognize the power of peer-peer tutoring mainly in mixed online classes where older

and more competent students could generally serve as teachers for their peers, which lightens the task of the online tutor who him/herself could learn from the rich learning community.

In the constructivist framework, learners are also responsible for assessing their own and peers' learning progress. Like peer tutoring, peer assessment is an essential component in constructivist online pedagogy as learners can learn from the mistakes of each other. The editing process in wikis, being limitless, is a practical opportunity to continuously correct one's and others' mistakes. Reference [41] clarifies that errors in the constructivist paradigm are a positive part of learning since "openness and allowance for errors is an opportunity to gain insight into understanding one's own constructs, and can influence growth for others' through interaction". Reference [42] calls for an informal environment that allows fearless learning--learning for the joy of learning, and encourages the students to take the risk and not to be worried all the time about failure. Pure constructivism calls for the elimination of grades and standardized summative tests and sees that assessment should be a formative one playing an important role in the learning process where students have a larger role in judging their own progress [51]. The teacher, in the constructivist framework, is no longer the one who sets out the learning criteria, schedule and outcome expectations, as in the behaviourist conventional education [41]. But the conundrum, here, is if learning outcomes are almost individually constructed, how can instructional designers set standards to evaluate the meaningfulness of the learning [52]. Reference [53] regards assessment as the "thorniest issue" to be resolved regarding the implications of constructivism for learning. Assessment is not the only clash between constructivists and instructional designers. There are still other grey areas where constructivists fail to entirely satisfy the instructional designers' needs.

#### V. THE LIMITATIONS OF THE CONSTRUCTIVIST LEARNING MODEL

Although the constructivist approach to online language learning has managed to a great extent to demonstrate the importance of active participation of students in the learning process, the approach is not without its downsides.

The cognitive constructivist learning theory is often blamed for its exaggerated emphasis on the autonomy of the individual learner. First, the total autonomy of learners in language construction makes it hard for instructional designers to predict how learners will learn or how to plan instructional activities--another clash between the bottom-up constructivist approach and the instructional designers top-down approach [54]. Second, not all learners benefit from having almost unlimited control over their own learning [55]. Lack of structure makes the constructivist learning experience "a tortuous path" [35] for some learners who just want to be told what they need to learn [56]. Reference [57] believes that appropriate learner guidance will make [their] learning by doing far more effective than "sink or swim" exploration [and that] to be truly effective this learning activity must be goal

driven and that these goals can be predetermined by the designer". Reference [58] assumes that allowing students to structure their own learning in 'ill structured' environments is "not a great virtue but abdication of our responsibility as teachers and instructors...students do not know or understand their own learning mechanisms." Furthermore, the tendency towards individualized forms of learning could undermine the cultural and social dimensions of online learning. The constructivist student-centred pedagogy may work in favour of some students and surely at the expense of others. Ensuring equity in opportunities is not a guaranteed because not all students have the same social background, and academic and technical prerequisites and skills. Moreover, as [59] suggests, constructivism could mask some "exclusionary practices" based on "low tolerance of internal difference, sexist and ethicized regulation" and power differentials. Reference [60] elucidates this further by claiming that constructivism is "limited by its failure to acknowledge that the schooling system recognizes only particular constructions of meaning" defined by the dominant culture. According to him, the students who came from different social and cultural groups were at a "distinct disadvantage" when entering the school system.

The individualized forms of learning and student autonomy could lead also to pedagogical chaos mainly in learning situations where conformity is essential; divergent thinking and eccentric stands and actions could undermine the overall pedagogical objective behind the learning material.

Piaget's theory tends to overlook the role of context, uses, and media, as well as the importance of individual preferences or styles, in human learning and development. "That's where Papert's 'constructionism' comes in handy" [61]. Constructionism, according to [62], shares the constructivism's view of learning as "building knowledge structures" through progressive internalization of actions, yet constructionism adds the idea that this could felicitously happen only in a context where the learner is consciously engaged in constructing a public entity, "whether it's a sand castle on the beach or a theory of the universe." However, even the socio-constructivist approach and its promotion of group work and collaborative construction of knowledge could not go beyond the mere frontiers of the physical learning group in class. Group work is generally restricted in terms of time, space, pace and relationship. It is also restricted by some psychological barriers such as fear of debate and by what some psychologists call, "Pathological politeness". Therefore, such limited collaborative learning poorly prepares the students for lifelong learning beyond the course and often results in a community isolated from the authentic world. Group work is essential but not sufficient for advanced forms of learning where the world has never been open to the other as it is after the revolution of social networks and Web. 2. Technologies.

## VI. CONCLUSION

At the end of this paper, it could be said that the constructivist principles of learner centredness, active learning, experiential learning, learning by doing, meta-cognition, scaffolding, and collaboration which have broken with the receptive teacher-centred "chalk-and-talk" didactic behaviourist teaching approach, have given online instructional designers ample opportunities of improving the quality of online English language teaching and learning. However, there is still an essential need to move beyond the cognitive/psychological view of constructivism to encompass a critical approach which addresses the sociological and cultural dimensions of learning. In other words, applied linguists and online instructional designers need to work on the development of more critical theory that tolerates cultural differences and diversity of opinions and copes with technological advancements. Today's world has been witnessing a swift pace of change in terms of the quantity and availability of knowledge and in terms of the nature of networks connecting people all over the world thanks to the ICT revolution. Accordingly, could the *connectivist* theory be the alternative, "the learning theory for the digital age," as [63] claims?

## REFERENCES

- [1] A. Hamat, and M. A. Embi, "Constructivism in the design of online learning tools," *European Journal of Educational Studies*, vol. 2, no.3, 2010, pp. 237-246.
- [2] M. Heisenberg, *Physics and Beyond*. New York: Harper and Row, 1971.
- [3] J. Dewey, "Psychology and social practice," *The Psychological Review*, vol. 7, 1900, pp. 105-124.
- [4] D. E. Kiwuwa, *Ethnic Politics and Democratic Transition in Rwanda*. New York, NY: Routledge, 2012.
- [5] T. M. Duffy, and D.J. Cunningham, "Constructivism: Implications for the design and delivery of instruction," in *Handbook of Research for Educational Communications and Technology*, D.H. Jonassen, Ed. NY: Macmillan, 1996, pp.170-198.
- [6] B.J. Wadsworth, *Piaget's Theory of Cognitive and Affective Development*, 5<sup>th</sup> Ed. New York: Longman, 1996.
- [7] J. P. Byrnes, *Cognitive Development and Learning in Instructional Contexts*. Boston: Allyn and Bacon, 1996.
- [8] S. B. Merriam, and R. S. Caffarella, *Learning in Adulthood: A Comprehensive Guide*. San Francisco: Jossey-Bass, 1999.
- [9] J. M. Royer, *Cognitive Revolution in Educational Psychology*. Charlotte: Information Age Publishing, 2005.
- [10] J. Piaget, *The Origins of Intelligence in Children*. New York: International Universities Press, 1952.
- [11] J. Piaget, *The Construction of Reality in the Child*. New York: Basic Books, 1954.
- [12] W. J. Rothwell, *Adult Learning Basics*. Alexandria, Va.: ASTD Press, 2008.
- [13] M. Flores, "Jean Piaget's theory of assimilation and accommodation given the recent discoveries on brain development," *Lessons Learned Blog*, Oct. 13, 2004. <http://surrenderandwin.blogspot.com/2004/10/jean-piagets-theory-of-assimilation.html>.
- [14] L.S. Vygotsky, *Mind in Society*. Cambridge, MA: Harvard, 1978.
- [15] E. W. Jenkins, "Constructivism in school science education: Powerful model or the most dangerous intellectual tendency?" *Science and Education*, vol. 9, 2000, pp.599-610.
- [16] Moodle philosophy, 2012. <http://docs.moodle.org/en/Philosophy>
- [17] M. McMahon, "Social constructivism and the World Wide Web: A paradigm for learning," *ASCILITE Conf.*, Perth, Australia, Dec. 1997.
- [18] L. Darling-Hammond, J. Rosso, K. Austin, S. Orcutt, and D. Martin, *The Learning Classroom: Theory into Practice*. Stanford University, 2003. [http://www.learner.org/courses/learningclassroom/support\\_pages/index.html](http://www.learner.org/courses/learningclassroom/support_pages/index.html)

- [19] T.M. Duffy, and D. H. Jonassen, *Constructivism and the Technology of Instruction: A Conversation*. Lawrence: Erlbaum Associates, 1992.
- [20] S.J. Brown, *John Seely Brown*, 2010. <http://www.johnseelybrown.com/speeches.html#digitalage>
- [21] S. J. Brown, and R. P. Adler, "Minds on fire: Open education, the long tail, and learning 2.0," *EDUCAUSE Review*, vol. 43, no. 1, Jan/Feb. 2008, pp.16-32.
- [22] J. G. Brooks, and M. G. Brooks, *In Search for Understanding the Case for Constructivist Classrooms*. Alexandria, Virginia: ASCD, 1993.
- [23] B. Wilson, J. Teslow, and R. Osman-Jouchoux, "The impact of constructivism (and postmodernism) on ID fundamentals," in B. Seels, Ed. *Instructional Design Fundamentals: A Reconsideration*. Englewood Cliffs, NJ: Educational Technology Publications, 1995, pp. 137-185.
- [24] C. Fosnot, "Constructing constructivism," in *Constructivism and the Technology of Instruction: A Conversation*, T.M. Duffy, and D.H. Jonassen, Eds. Hillsdale: Lawrence Erlbaum, 1992, pp. 167-176
- [25] E. Bredo, "Reconsidering social constructivism: The relevance of George Herbert Mead's interactionism," in *Constructivism in Education: Opinions and Second Opinions on Controversial Issues*, D.C. Phillips, Ed. Chicago, Illinois: The University of Chicago Press, 2000, pp.109-123.
- [26] C. C. Bonwell, and J.A. Eison, *Active Learning: Creating Excitement in the Classroom*. Washington, DC: George Washington University, School of Education and Human Development, 1991.
- [27] D. N. Perkins, "Technology meets constructivism: Do they make a marriage?" *Educational Technology*, vol. 31, no. 5, 1991, pp. 19-23.
- [28] J. Solomon, "The rise and fall of constructivism," *Studies in Science Education*, vol. 23, 1994, pp. 1-19
- [29] Y. Karagiorgi, and L. Symeou, "Translating constructivism into instructional design: Potential and limitations," *Educational Technology & Society*, vol. 8, no. 1, 2005, pp. 17-27.
- [30] J. C. Bringuier, *Conversations with Jean Piaget*. Chicago: The University of Chicago Press, 1980.
- [31] M. G. Jones, and L. Brader-Araje, "The Impact of constructivism on education: Language, discourse and meaning," *American Communication Journal*, vol. 5, no. 3, 2002.
- [32] P. Cole, "Constructivism revisited: A search for common ground," *Educational Technology*, vol. 33, no. 2, 1992, pp. 27-34.
- [33] D. Kolb, *Experiential Learning as the Science of Learning and Development*. Englewood Cliffs, NJ: Prentice Hall, 1984.
- [34] L. Dixon-Krauss, *Vygotsky in the Classroom: Mediated Literacy Instruction and Assessment*. Toronto: Copp Clark Longman Ltd, 1996.
- [35] D.N. Perkins, "What constructivism demands of the learner" in *Constructivism and the Technology of Instruction: A Conversation*, T. M. Duffy, and D.H Jonassen, Eds. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1992, pp. 161-166.
- [36] Z. G. Deymi, "Can e-assessment be the key? Moodle testing system: A case in study," *The International Journal of Humanities Education*, vol. 14, no. 1, 2015, pp.1-15
- [37] W. Gray, "E-assessment, say goodbye to paper-based test," 2011. <http://article.abc-directory.com/article/8308>
- [38] J. Askew, "Educational theories," n.d. <http://crescentok.com/staff/jaskew/isr/education/theories.htm>
- [39] R. Mason, "Models of online courses," *ALN Magazine*, vol. 2, no. 2, Oct. 1998. [http://aln.org/alnweb/magazine/vol2\\_issue2/Masonfinal.html](http://aln.org/alnweb/magazine/vol2_issue2/Masonfinal.html)
- [40] D. Laurillard, "Multimedia and the changing experience of the learner," in *Proc. of Asia Pacific Information Technology in Training and Education Conf. and Exhibition: APITITE 94*, M. Ryan, Ed. Brisbane, Australia, vol. 1, 1994, pp. 19-24.
- [41] S. Gulati, "Constructivism and emerging online learning pedagogy: A discussion for formal to acknowledge and promote the informal," *Annu. Conf. of the Universities Association for Continuing Education: Regional Futures: Formal and Informal Learning Perspectives*, Centre for Lifelong Learning, University of Glamorgan, Apr. 2004, pp. 5-7. <http://www.leeds.ac.uk/educol/documents/00003562.htm>
- [42] S. D. Brookfield, *Understanding and Facilitating Adult Learning*. Milton Keynes. Open University Press, 1986.
- [43] P.Kollock and M. Smith. "Managing the virtual commons: Cooperation and conflict in computer communities" In *Proc. of Computer-Mediated Communication: Linguistic, Social, and Cross-Cultural Perspective Conf.* Amsterdam, John Benjamins, 1996, pp. 109-128.
- [44] G. Salmon, *E-Moderating: The Key to Teaching and Learning Online*. London: Kogan Page, 2000.
- [45] M. Beaudoin, "Learning or lurking? Tracking the 'invisible' online student," *The Internet and Higher Education*, vol. 5, 2002, pp. 147-155.
- [46] B. Nonnecke, and J. Preece, "Silent participants: Getting to know lurkers better," *From Usenet to CoWebs*, 2000, pp. 110-132. <http://www.cis.uoguelph.ca/~nonnecke/research/silentparticipants.pdf>
- [47] F.A. Garforth, *John Dewey Selected Educational Writings*. London: Heinemann Educational Books Ltd, 1966
- [48] P. Goodyear, S. Banks, V. Hodgson, and D. McConnel, "Research on networked learning: An overview," in *Advances in Research on Networked Learning*, P. Goodyear et al. Eds. GB: Kluwer, 2004, ch. 1.
- [49] P. Cobb, "Constructivism and Learning," In *International Encyclopaedia of Education*, T. Husen, and T. N. Postlethwaite, Eds. Oxford: Pergamon Press, 1994, pp. 1049-1051.
- [50] R. Slavin, *Cooperative Learning: Theory, Research and Practice*. Englewood Cliffs, NJ: Prentice Hall, 1990.
- [51] S. Yurkiw, "Learning with confidence," *ElearnSpace: Everything Elearning*, 2002. <http://www.elearnSpace.org/Articles/valueoffailure.htm>
- [52] R.S. Prawat, and R.W Floden, "Philosophical perspectives on constructivist views of learning," *Educational Psychology*, vol. 29, 1994, pp. 37-48.
- [53] D. H. Jonassen, "Evaluating constructivistic learning," in *Constructivism and the Technology of Instruction: A Conversation*, T.M. Duffy, and D.H. Jonassen, Eds. Hillsdale: Lawrence Erlbaum, 1992, pp. 1 37-148.
- [54] S. Draper, "Constructivism and instructional design," *The Performance Juxtaposition Site*, 1997. <http://www.psy.gla.ac.uk/~steve/constr.html>
- [55] A. M. O' Donnell, "Constructivism by design and in practice: a review," *Issues in Education*, vol. 3, no. 2, 2000, pp. 285- 294.
- [56] D. N. Perkins, "The many faces of constructivism," *Educational Leadership*, vol. 57, no. 3, 1999, 6-11.
- [57] M. D. Merrill, "Instructional strategies that teach," *CBT Solutions*, Nov. /Dec., 1997, pp. 1-11.
- [58] M. D. Merrill, "First principles of instruction," *Educational Technology Research and Development*, vol. 50, no. 3, 2002, pp. 43 - 59.
- [59] G. Cousin, and F. Deepwell, "Designs for network learning: A communities of practice perspective," *Studies in Higher Education*, vol. 30, no. 1, 2005, pp. 57-66.
- [60] R. Zevenbergen, "Constructivism as a liberal, bourgeois discourse," *Educational Studies in Mathematics*, vol. 31, no. 1-2, 1996, pp. 95-113.
- [61] E. Ackermann, "Piaget's constructivism, Papert's constructionism: What's the difference?" *Future of Learning Group Publication*, vol. 5, no. 3, 2001, pp. 1-11.
- [62] S. Papert, "Preface," in *Constructionism: Research Reports and Essays*, I. Harel and S. Papert, Eds. Norwood, NJ: Ablex, 1991, p. 1.
- [63] G. Siemens, "Connectivism: A learning theory for the digital age," *ElearnSpace*, 2004. <http://www.elearnSpace.org/Articles/connectivism.htm>.
- [64] M. Huberman, "Networks that alter teaching: Conceptualizations, exchanges and experiments," *Teachers and Teaching: Theory and Practice*, vol. 1, no. 2, Oct. 1995, pp. 193-211.