

A Review of Constructivist Teaching Practices

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Abstract: In recent years, constructivist theory has attracted scholars' attention in education. In contrast to previous theories of learning, constructivist theories engage the learner in learning process more. Since teachers are an important lever in education, they should be in line with new reforms and alter the environment of classroom accordingly. The first step in changing environment of classroom is the practices that teacher implement in the classroom which should be consistent with new changes. The following paper, reviews the purpose of teaching practices, two main theories of it and strategies for classroom practices.

Key words: Constructivist teaching • Teaching practices

INTRODUCTION

Constructivism has come to existence as one of the most effects on the education practices in recent years. Many scholars have defined constructivism in education. According to Davis, Maher & Noddings [1], in constructivism it is supposed that learners build their knowledge both collaboratively and individually. Each individual has a specific knowledge and concept through which construct new knowledge and the community help them to provide setting and pose questions [1]. Von Glaserfeld [2] believes that knowledge is in the mind of learner and the thinking subject construct what they know based on their own experience. Jenkins [3] asserts that the improvement of understanding needs active engagement of learners. Constructivist theory of education noted that learner is the one who constitute knowledge based on prior experience [4]. Brooks [5] highlighted that constructivism is a theory about learning and knowledge rather than a theory of learning. This theory defines knowledge as socially, culturally, developmental and temporary mediated.

According to constructivism; learning is hustled via authentic and interactive experiences that are in accordance with the interests of the students; learning is

attainment of significant competences in a realistic context; and knowledge is assumed to be both socially and individually constructed [6]. So, the development of an appropriate environment for building knowledge instead of transferring it should be the focus of teaching. According to presupposition of constructivist theory, reality is created but individuals rather than being determined. According to Pedersen, Yager & Yager [7] this reality creation in classroom setting is displayed in the form of a need for involving students in maintaining and developing their own positive learning environment [8].

According to Matthews [9], Piaget was the earliest contributor of this research who suggests that new knowledge is attained by existing knowledge, a process of assimilation and accommodation. Another contributor of constructivist research is von Glaserfeld [2] who believes that constructivism is a theory of rational knowing. Matthews [9] believes that learners construct their knowledge based on subjective experiences. Accordingly, constructivist teaching focus on basic skills as well as reflecting, understanding, reasoning and applying [9]. Constructivist teaching is on the basis of constructing knowledge by the learner rather than reproducing the knowledge of someone else.

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Constructivist Pedagogy: Atwell [10] as well as Fosnot [11] have sparked recent interest in teaching in constructivist manner. Researches about constructivist pedagogy became important in various subjects of study. For example teaching of writing was proposed by Freedman [12]; science by Tobin [13]; mathematics by Cobb, Wood, Yackel, Nicholls, Wheatley, Trigatti & Perlwitz[14] and Wood, Bruner, & Ross [15]; and history by Wilson & Wineburg [16]. These researchers have compared constructivist teaching with transmission model and have found significant differences in these two teaching approaches. Some of the characteristics counted for constructivist pedagogy are: (a) unplanned and planned introduction of knowledge to conversation by exploring websites, referencing to text, direct instruction etc.; (b) respecting the individual's background and improving comprehension of beliefs regarding elements of the domain; (c) improving students' awareness of their learning process and understanding; (d) exploring elements of the domain and facilitating the dialogues among groups in order to create and share understanding a knowledge; and (e) providing students the opportunity for recognizing, challenging and altering or adding to current understandings and beliefs. According to Gür [17] learning in constructivist pedagogy is an active process in which knowledge is constructed and created by learners; it is both context-based and personal and is constructed in social context.

Constructivist Teaching Practices: Because of different beliefs of teachers, various kinds of teaching practices would be implemented in classrooms [18, 19]. Recently, constructivist framework has provided reform efforts in education. Chen [20] believes that by considering teachers' teaching practice from this perspective would give appropriate data about classroom activities. Since the process of attaining the knowledge is as significant as the product, teaching practices are totally various with traditional teaching practices [20- 22].

Additional benefits and challenges are presented in the classroom by practical use of constructivist practices to students and teachers [5]. Teacher's challenge in such classroom is providing related frameworks that enable students to construct comprehension and knowledge and behave as a facilitator instead of a knowledge-bearer. Gieryn [23] asserts that for using constructivist framework in the classroom teachers have to move in direction which is in contrast with the way they themselves were taught.

In constructivist perspective, it is believed that teachers' role is to improve students' conceptual and personal understanding rather than transferring and presenting the knowledge to the students and correct their misunderstanding [20]. In such classroom, teachers' role is to facilitate and operate the discussion. As a result, the principal focus of teachers should be based on helping students by posing questions in order to administer their own result on the subject. In this type of teaching, students acquisition of data would be strengthen [20].

According to Brooks [5] teachers' role in constructivist classroom is to (a) reconcile curriculum to address students' assumption; (b) display the problems that learners may face to them; (c) assess students' learning in the context of teaching; (d) look for students' ideas; and (e) construct learning based on primary concepts. Von Glaserfeld [2] asserts that constructivist teachers should be able to use data regarding the implementing of teaching methodologies that provide students the chance of constructing their own knowledge [8]. Assessment in such classroom is not only based on tests, but also on observation of the student, the student's work and the student's points of view. In constructivist classroom teachers should construct the sense of depth about a concept which requires more concentration on process rather than products [5]. The environment of such classroom is based on inquiry that results in deep understanding of concept.

In educational context there are different perspectives from cognitive [24], social constructivism [25] to radical constructivism [2]. But most constructivist writers believe that there are two major forms of constructivism – cognitive constructivism and social constructivism [26-31]. A constructivist conception of education highlights the cognitive aspects of learning as well as improvement of the learner in his social context [32- 35]. In order to provide a theoretical background for understanding teaching practices from constructivist perspectives, these two main constructivist perspectives are discussed respectively.

Cognitive Constructivist Perspective: According to Von Glaserfeld [2], cognitive constructivism is the base of the idea of constructivism and its principals are the root of constructivism [36]. Cognitive constructivism originated from Jean Piaget [37]. This type of constructivism which is also known as personal constructivism contradicts the

traditional learning model in which knowledge is transferred from a more knowledgeable person to the learners. In this perspective, learner is the one who actively construct the knowledge rather than the one who passively receives the knowledge from environment [36].

As mentioned by Chen [20], Piaget accented that connectedness of knowledge is very important and it should be constructed according to individuals' previous knowledge and personal experience [2, 21, 22]. He noted that in cognitive constructivism learner has specific knowledge which is the mixture of formal and informal knowledge and the current knowledge and experiences appear when they are exposed to permanent events and objects in the environment. In other words previous knowledge and experiences is the significant factor that influences the current process [21, 22].

Skaalid [38] asserts that in Piaget's view, for showing the mental process the mechanism of assimilation, accommodation; disequilibration and equilibration should be used. Through this mental process, learner could be able to organize mental structures. Chen [20] mentioned that assimilation is the learners' attempt to build and rebuild the knowledge by linking them to the previously experienced ideas or objects. Skaalid [38] asserts that accommodation happens when the learner finds out that the current knowledge does not suit the existing knowledge and his/ her power is not sufficient to describe their conceptual matters. Through the process of assimilation learners could be able to relate new information with previous knowledge. Disequilibrium occurs when new experiences and previous understanding don't fit; so through disequilibrium, learners have to modify the existing knowledge in order to gain new knowledge and experiences [2, 20, 39]. Within equilibrium process, the learner comes to the existing knowledge at highest levels. As a result, the new knowledge begins via adaptation to new experiences [20, 22, 39].

Piaget believes that the perception of the individual from reality revises and reconstruct continuously because of being exposed to new experience [40]. Piagetian also assert that individual differences have significant effect on constructing knowledge; differences that trace back to their specific realization of the world [20].

Piaget has used mechanisms assimilation, accommodation; disequilibration and equilibration in order to indicate the mental process that occurs for learner to organize mental structure [38]. According to Chen [20]

assimilation is the learner's attempt to construct and reconstruct the knowledge through relating them to the previous idea or experience. It integrates existing knowledge with new and enables the learner to explain the way things behave or work through relating them to the previous experience [41]. Once the new experience changes to an unfamiliar one, the learner experiences accommodation [41]. It occurs when the learner realize that new knowledge can't describe their perceptual issues and doesn't fit previous knowledge [38]. An ideal education setting engage learner in both assimilation and accommodation process [41].

When there isn't accordance between previous understanding and new knowledge, the learner enters to the process of disequilibrium in which they have to modify their existing knowledge to reach new knowledge and experience [2, 20]. This process stimulates the learner to revise their notion of behavior of objects. Disequilibrium result in the occurrence of process of equilibrium in the learner' existing knowledge and learner start adapting to the new experiences [20, 22].

Social Constructivist Perspective: Social constructivism theory is owed to Lev Vygotsky who set the foundation of this perspective in developmental cognition [42- 44]. His theories assert the pivotal role of social interaction in development of cognition. Vygotskey believed that community has an important role in the process of meaning making. Von Glaserfeld [2] highlighted that the individual's knowledge from the world is based on personal experience as well as interaction with others [45]. In this perspective, learning is a behavior that is individually constructed and socially supported [46-48]. So in social constructivism, others are actively involved in the process of learning. Duffy & Cunningham [49] believe that social constructivism focus on both cultural and social context of cognition; so collaboration with others and learning in groups are valuable factors in this perspective.

Adams [50] mentioned that in social constructivism others help the individual to construct the knowledge and learning in this perspective is completely social. Sutherland, Armstrong, Barnes, Brawn, Breeze, Gall & Triggs [51] asserts that individuals bring some implied perspectives and theories from their cultural perimeter. Besides, through inter-psychological aspects of knowledge they would be able to formulate this culture. The significance of context and culture in understanding issues in community is also emphasized [44, 52-55].

According to Brooks [5], in his theory, Vygotsky concentrates on role of others and community in learning. He believes that people's life experience is an important factor in development, progress and learning. He highlights that social context, forms the way people think. Learning in this perspective would result in a development which is part of the social context. In Vygotskey's perspective, the meaning is constructed from reality rather than passively received information from environment [36]. Vygotskey coined the term zone of proximal development (ZPD) in order to indicate to the difference between what learner can do lonely and what they can do in collaboratively [47]. Vygotskey believes that the rate of learning would increase if the learner collaborates with others in their zone of proximal development.

Wood, Bruner, & Ross [15] defined scaffolding as a notion related to ZPD. They assert that scaffolding is a process in which the expert or teacher assists the learner to solve a problem or carry out a task that learner can't do alone. Scaffolding is the teacher's controlling the elements of the task which are beyond the learner's capacity. Once the skills of learner improve, the scaffold would be removed little by little until the learner's performance stand alone [56].

Learning with ZDP occurs in four stages. In The first stage, more capable others assist the learner. The amount of outside help is according to the characteristics of the learner and difficulty of the task. Because of limited understanding of this stage, the experts offer modelling or direction and the responses of the learners are imitative. But gradually, learner can understand the meaning of performance or the way different segments of activity are related. After acquiring some conceptions of the overall performance, further help is offered through question, feedback and more cognitive structuring [49].

The expert helps by grading tasks and by structuring the tasks into sub-goals in a similar way to the analysis of the task [57]. Those who want to assist performance should have a deep knowledge of subject matter because without such knowledge, they can't reformulate the goals of interaction. During this stage, the teacher's responsibility for performance of the task decreases steadily and instead, the proportion of learners' responsibility increase. Shifting from other regulation to self-regulation is the developmental task in this stage. The teacher's task is to assist the learner by understanding the goal of task and being responsive to the learner's effort. This stage would be fully accomplished when the responsibility of helping, transferring and performing the

task is handed over to the learner. In stage two, performance would be helped by itself. In this stage, the learner implements the task without others' assistance. Of course it doesn't mean that the learner's performance has been automatized or developed. It includes the next stage in passing of assistance or control from the teacher to the learner. Learner starts to direct and guide issues that were guided by others [49].

In stage three, the performance would be automatized and developed. After disappearance of all the evidences of self-regulation, the learner move from the zone of proximal development (ZPD) to the developmental stage of the task. At stage three, the learner doesn't need the assistance from the self or expert because assistance at this level is would be disruptive. Performance has developed at this stage. In last stage, performance become de-automatized and result in recursion back through the zone of proximal development. Individual's life-long learning is made up of these sequences from assistance of others to the self-assistance and recurring several times for the development of new capacities. Every individual would experience this cycle [49].

Although cognitive and social constructivism have some differences, but both Piaget and Vygotskey assume that teacher's role is guiding students and facilitating the way of their learning instead of being just a director and transmitter of knowledge. Both of the theories believe that students' background knowledge has vital role in constructing new knowledge and understanding new concepts. According to Jonassen [58] both cognitive and social theories construct knowledge instead of reproduce it. The environment of learning encourages learners to reflect on student.

The Role of Constructivist Teacher: Teachers' role in constructivist classroom is to reclaim conceptual and personal comprehension rather than displaying the knowledge to the students [20]. Since teachers act as facilitator I such classroom, their primary role is to help learners to ask questions for managing their results. Teachers must have commitment to the learners and toward to learners' outcomes so they can attain the highest level of teaching practice [59]. According to von Glasserfeld [2] a constructivist teacher has to utilize the teaching methodologies in a way that give the learners the opportunity of constructing their own knowledge [8]. Teachers should how to behave differently with students. In such constructivist classroom, teacher assesses the learner by observation of them, their work and their point of view instead of taking tests [61].

Constructivist teachers have different opinion about reflection, instruction, planning and concept. These teachers who have trained by constructivist methods, can train their students to use these methods while traditional teachers can't implement constructivist principles and methods in their classrooms [60]. Constructivist teacher recognizes that they should adopt the content knowledge with learners' needs and interests. By this concern, learners understand that teacher respects them as human and teachers would be able to know more about learners' interests [61]. It's very essential for constructivist teacher to recognize the most vital concepts of their subjects for assisting the learners to improve the concepts [61]. According to Henson [61] instead of direct showing the concepts, constructivist teachers can display knowledge that is based on present knowledge of students and create the state of disequilibrium in their mind.

Strategies for Constructivist Teaching Practices: Many researchers believe that constructivist teaching practices enable the learner to be involved in exploratory and discovery activities [5, 21, 22]. Constructivist teachers can implement a set of constructivist teaching practices in order to facilitate the process of discovery and exploratory activities for the learners [5]. One strategy is to develop the social interaction of learner within learning [5, 21, 22]. For reaching this goal researchers suggest several techniques such as Leading the discussion activities and negotiation of learners as a facilitator by asking questions [5, 20]; using reciprocal teaching strategies in order to enable students to act, react and interact with groups by engaging in discussion, collaboration and problem solving activities [5, 20]; and reflecting and constructing the primary rules and norms for learners to cooperate with others [20].

Another strategy is to boost the learners' ability in independent problem-solving skills by: (a) patronizing learners to make decision based on their own goals and seek for their own solutions instead of their teacher's response [5, 20]; (b) encouraging students to apply high-order thinking skills for identifying, evaluating and reflecting their learning critically [62]; and (c) encourage students to be initiative and autonomous thinkers, to improve the level of responsibility in their learning and to be problem solvers [5, 19].

The third strategy is to assuming teacher's role as someone that guides and facilitates learner's construction of knowledge [2, 5]. They counted some

strategies as helpful one for making teachers good facilitators. One strategy is to ask questions in order to extract learner's thinking about their ideas expansively and deeply [5, 20]. Another way is to ask thoughtful and open-ended questions for patronizing learners to utilize their high-order thinking skills and seek for their own solution for problems. They also can recognize whether students have enough time to reflect on questions [2, 19]. The last strategy is to ask learners questions in order to recognize the problems they face [20].

The last strategy is patronizing teachers to build learning experience on the prior or present experiences of the learners [5, 42]. Constructivist teaching practices should exert some instructional strategies in order to reach this goal. They can recognize every individual needs and differences [5, 19]; consider the values, experience and knowledge that students bring to the class and their endeavor for merging their understanding with new experiences [19, 20]; and make images and examples that are related to the existing knowledge of learner to explaining new knowledge [21, 22, 42].

CONCLUSION

Teaching methods and educational curricula are shifting. In the traditional curriculum, teacher's role was transmitting information to the students and students passively listened and acquired the fact. But in current redevelopment, focus of instruction has altered from teacher-centered to the student-centered. In this new perspective which is called constructivist teaching, students actively involved in the process of their learning. Constructivism is a view of learning that believes knowledge isn't a thing to be transferred by the teacher at the front of the room to learners' desks. But it knowledge is built by learners through mental process of improvement and learners are creators of knowledge and meaning. As a result teaching practices have to be changed in such classrooms. Teachers are no longer experts who know the respond of the questions he or she has constructed. But the teacher is a facilitator who assists the learners to construct their own knowledge. The crucial task a teacher should do is watching, listening and asking questions to know about the learners and the way they learn in order to help them more. This review has offered the underlying theories with a few strategies to improve such classrooms. But still further research is needed to improve such classroom practices.

REFERENCES

1. Davis, R.B., C.A. Maher and N. Noddings, (Eds.). 1990. Constructivist views on the teaching and learning of mathematics.
2. Von Glaserfeld, E., 1989. Cognition, construction of knowledge and teaching. *Synthese*, 80(1): 121-140.
3. Jenkins, E.W., 2000. Constructivism in school science education: powerful model or the most dangerous intellectual tendency? *Science and Education*, 9(6): 599-610.
4. Nola, R., 1999. Constructivism in science and science education: a philosophical critique. *Science & education*, 6(1-2): 55-83.
5. Brooks, J.G., 1999. In search of understanding: The case for constructivist classrooms: ASCD.
6. Arsalan, B. and O. Demirel, 2008. Contribution to the student achievement of using different teaching methods in the fourth science and technology course in primary education. *World Appl. Science Journal*, 4(1): 37-43.
7. Pedersen, J., S. Yager and R.E. Yager, 2011. Student Leadership Ambassadors: Effects of Leadership Distribution Using a Student-Centered Leadership Program. *WeLEAD ejournal of organizational learning and leadership*. Spring 2011, 9: 1.
8. Singh, A., S.O. Yager, N. Yutakom, R.E. Yager and M.M. Ali, 2008. Constructivist Teaching Practices Used by Five Teacher Leaders for the Iowa Chautauqua Professional Development Program. *International Journal of Environmental and Science Education*, 3(3).
9. Matthews, W.J., 2003. Constructivism in the Classroom: Epistemology, History and Empirical Evidence. *Teacher Education Quarterly*, 30(3): 51-64.
10. Atwell, N., 1998. In the middle: New understandings about writing, reading and learning: ERIC.
11. Fosnot, C., 1989. Enquiring teachers, enquiring learners: A constructivist approach to teaching. New York: Teachers College Press.
12. Freedman, S., 1989. Exchanging Writing, Exchanging Cultures. The Quarterly, Vol. 11, No. 3. Cambridge, MA: Harvard University Press.
13. Tobin, K.G., 1993. The practice of constructivism in science education: Psychology Press.
14. Cobb, P., T. Wood, E. Yackel, J. Nicholls, G. Wheatley, B. Trigatti and M. Perlwitz, 1991. Assessment of a problem-centered second-grade mathematics project. *Journal for research in mathematics education*, 3-29.
15. Wood, D., J.S. Bruner and G. Ross, 1976. The role of tutoring in problem solving*. *Journal of child psychology and psychiatry*, 17(2): 89-100.
16. Wilson, S.M. and S.S. Wineburg, 1993. Wrinkles in time and place: Using performance assessments to understand the knowledge of history teachers. *American Educational Research Journal*, 30(4): 729-769.
17. Gür, T., 2013. Pre-Service Turkish Language and Primary School Teachers' Perceptions of Constructivism by Analyzing Their Concepts. *Middle East Journal of Scientific Research*, 13(2).
18. Iran-Nejad, A., 1995. Constructivism as substitute for memorization in learning: Meaning is created by learner. *EDUCATION-INDIANAPOLIS-*, 116: 16-16.
19. Shapiro, B., 1994. What Children Bring to Light: A Constructivist Perspective on Children's Learning in Science. *Ways of Knowing in Science Series*: ERIC.
20. Chen, W., 1997. Differences between constructivist-oriented teaching practices of expert and novice teachers in elementary physical education. 9808236 Ph.D., The University of Alabama, Ann Arbor. Retrieved from <http://search.proquest.com/docview/304336682?accountid=27932> ProQuest Dissertations & Theses Full Text database.
21. Cobb, P., 1994a. Constructivism in mathematics and science education. *Educational Researcher*, 23(7): 4-4.
22. Cobb, P., 1994b. Where is the mind? Constructivist and sociocultural perspectives on mathematical development. *Educational Researcher*, 23(7): 13-20.
23. Gieryn, T.F., 1999. Cultural boundaries of science: Credibility on the line: University of Chicago Press.
24. Piaget, J., 1967. Biologie et connaissance, Paris, France: Editions Gallimard; transl. as: Biology and knowledge: An essay on the relations between organic regulations and cognitive processes.
25. Vygotskii, L.L.S., 1978. Mind in society: The development of higher psychological processes: Harvard university press.
26. Abdal-Haqq, I., 1998. Constructivism in Teacher Education: Considerations for Those Who Would Link Practice to Theory. *ERIC Digest*.
27. Oxford, R.L., 1997. Constructivism: Shape-shifting, substance and teacher education applications. *Peabody Journal of Education*, 72(1): 35-66.
28. Phillips, D.C., 1995. The good, the bad and the ugly: The many faces of constructivism. *Educational Researcher*, 24(7): 5-12.

29. Richardson, V., 1997. Constructivist teaching and teacher education: Theory and practice. *Constructivist teacher education: Building new understandings*, 3-14.
30. Richardson, V., 2003. Constructivist pedagogy. *The Teachers College Record*, 105(9): 1623-1640.
31. Vadeboncoeur, J.A., 1997. Child development and the purpose of education: A historical context for constructivism in teacher education. *Constructivist teacher education: Building new understandings*, 15-37.
32. von Glaserfeld, E., 2000. Piaget's legacy: Cognition as adaptive activity Understanding representation in the cognitive sciences (pp. 283-287): Springer.
33. Bereiter, C., 1994. Constructivism, socioculturalism and Popper's world 3. *Educational Researcher*, 23(7): 21-23.
34. Billett, S., 1996. Situated learning: Bridging sociocultural and cognitive theorising. *Learning and instruction*, 6(3): 263-280.
35. Anderson, J.R., J.G. Greeno, L.M. Reder and H.A. Simon, 2000. Perspectives on learning, thinking and activity. *Educational Researcher*, 29(4): 11-13.
36. Liu, C.C. and I.J. Chen, 2010. Evolution of constructivism. *Contemporary Issues in Education Research (CIER)*, 3(4): 63-66.
37. Dougiamas, M., 1998. A journey into constructivism. Retrieved September, 15: 2004.
38. Skaalid, B., 2007. A developmental study concerning the design and implementation of constructivist learning environments. Proquest.
39. Lyddon, W.J. and J.T. McLaughlin, 1992. Constructivist psychology: A heuristic framework. *Journal of Mind and Behavior*.
40. Jones, M.G. and L. Brader-Araje, 2002. The impact of constructivism on education: Language, discourse and meaning. *American Communication Journal*, 5(3): 1-10.
41. Brown, A.L., 1994. The advancement of learning. *Educational researcher*, 23(8): 4-12.
42. Iran-Nejad, A., 1994. The Global Coherence Context in Educational Practice: A Comparison Piecemeal and Whole-Theme Approaches to Learning and Teaching. *Research in the Schools*, 1(1): 63-76.
43. Palmer, D., 2005. A motivational view of constructivist-informed teaching. *International Journal of Science Education*, 27(15): 1853-1881.
44. Bay, E., B. Bagceci and B. Cetin, 2012. The Effects of Social Constructivist Approach on the Learners' Problem Solving and Metacognitive Levels. *Journal of Social Sciences*, 8(3): 343-349.
45. Jones, M.G. and L. Brader-Araje, 2002. The impact of constructivism on education: Language, discourse and meaning. *American Communication Journal*, 5(3): 1-10.
46. Carroll, J. and J. Ryan, 2005. *Teaching international students: Improving learning for all*: Routledge.
47. Vygotsky, L., 1988. *The Role of Play in Development. In Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, S. Scribner and E. Souberman. Cambridge, Mass.: Harvard University Press.
48. Hung, H.L. and E. Hyun, 2010. East Asian international graduate students' epistemological experiences in an American university. *International Journal of Intercultural Relations*, 34(4): 340-353.
49. Dunphy, B.C., 2003. Assisted performance and the Zone of Proximal Development (ZPD); a potential framework for providing surgical education. *Australian Journal of Educational & Developmental Psychology*, 3(2003): 48-58.
50. Adams, P., 2006. Exploring social constructivism: Theories and practicalities. *Education*, 34(3): 243-257.
51. Sutherland, R., V. Armstrong, S. Barnes, R. Brawn, N. Breeze, M. Gall,... P. Triggs, 2004. Transforming teaching and learning: embedding ICT into everyday classroom practices. *Journal of Computer Assisted Learning*, 20(6): 413-425.
52. Fosnot, C.T., 1996. *Constructivism. Theory, Perspectives and Practice*: ERIC.
53. Jonassen, D., M. Davidson, M. Collins, J. Campbell and B.B. Haag, 1995. Constructivism and computer-mediated communication in distance education. *American Journal of Distance Education*, 9(2): 7-26.
54. Asidas, C., 2000. Constructivism versus objectivism: Implications for interaction, course design and evaluation in distance education. *International Journal of Educational Telecommunications*, 6(4): 339-362.
55. Woo, Y. and T.C. Reeves, 2007. Meaningful interaction in web-based learning: A social constructivist interpretation. *The Internet and Higher Education*, 10(1): 15-25.
56. Gray, P. and J. Feldman, 2004. Playing in the Zone of Proximal Development: Qualities of Self-Directed Age Mixing between Adolescents and Young Children at a Democratic School. *American Journal of Education*, 110(2): 108-146.
57. Gagné, R.M. and R.M. Gagné', 1985. Conditions of learning and theory of instruction.

58. Jonassen, D.H., 1994. Thinking Technology: Toward a Constructivist Design Model. *Educational technology*, 34(4): 34-37.
59. Ableser, J., 2012. Exemplary Teaching Practices across Educational Contexts (P-20+): Unifying Principles.
60. Oguz, A., 2008. The Effects of Constructivist Learning Activities on Trainee Teachers' Academic Achievement and Attitudes. *World Applied Sciences Journal*, 4(6): 837-848.
61. Henson, K.T., 2004. Constructivist methods for teaching in diverse middle-level classrooms: Allyn & Bacon.
62. Prawat, R.S. and R.E. Floden, 1994. Philosophical perspectives on constructivist views of learning. *Educational Psychologist*, 29(1): 37-48.