Research Article

UTILIZING THE THEORY OF CONSTRUCTIONISM IN TEACHER EDUCATION: THE RELATIONSHIP BETWEEN CONSTRUCTIONISM AND MICRO-TEACHING

*Klada Nektaria

Pedagogical Department, School of Pedagogical and Technological Education (ASPETE), Athens, Greece

Abstract

The rapid changes that affect every social sector, and education in particular, leads to the need for evolution of the educational system as well as of teachers. In this context, teacher training and retraining continues to be a topical theme for the scientific community. At the same time, the nature of learning and the pathways in which it can be achieved for those involved in learning or social interaction procedures is a topic that continues to be a concern of educational research. Based on the above, this paper very briefly presents the theory of Papert's Constructionism, focuses mainly on the social aspect of Constructionism and briefly presents the results of this approach, in the learning process. Subsequently, the relevance of this theory to learning environments, and more specifically to Micro-teaching, which is applied in university departments of Teacher Education, is presented. The research was carried out by means of a literature review, while specific criteria for literature investigation were used and a specific process of searching mainly international sources was employed. Finally, a conclusion is drawn on how the practice of microteaching can be used to approach the learning of teacher candidates in the light of Constructionism.

Keywords: Constructionism, Microteaching, Teacher's Education, Learning Theory.

INTRODUCTION

The rapid changes that affect every social sector, and education in particular, leads to the need for the evolution of the educational system and teachers. In this context, the education of teachers as well as their re-education continues to concern the scientific community as a topical issue [31]. At the same time, the perception of the nature of learning and personal and social development is at the center of scientific research. In particular, assumptions related to the origin of knowledge, its constitution, the purposes it serves and its acquisition have a decisive influence on the intentions and choices of those involved in processes of learning or social interaction [18]. This potential of social interaction in knowledge construction is related to the theory of constructivism, according to which learner's construct knowledge rather than acquire new knowledge. Therefore, learning is an active process throughout the learners' experiences and the environment in which they learn. Thus, in line with the above, the emphasis is on mainly on the learners and on the creation of collaborative, interactive environments [3]. A descendant of Constructivism is Papert's theory according to which knowledge is constructed where complex problems and real issues arise in learning environments. In particular, where learners are engaged and involved. For Papert, knowledge is an essential foundational element in the context of learning and is shaped by product design [24]. This theoretical positioning can be utilized in Teacher Education which one of the current and controversial educational issues, in the international community. In particular, we are particularly interested in teacher education practices that enhance reflective and metacognitive learning processes. This theoretical positioning can be utilized in Teacher Education which one of the current and controversial educational issues, in the international community.

*Corresponding Author: *Klada Nektaria*
Pedagogical Department, School of Pedagogical and Technological Education (ASPETE), Athens, Greece

In particular, we are particularly interested in teacher education practices that enhance reflective and metacognitive learning processes. One such practice is microteaching, which is practiced in many academic departments of pre-service teachers [14]. The purpose of this article, therefore, is to highlight how Constructivism theory is transformed within the context of Microteaching, which is often implemented in Teacher Education departments. We consider this highlighting important because, while the microteaching method has been well studied mainly in terms of its effects on the trainee or practicing teacher, what is missing from the literature is how this teaching practice helps in the construction of knowledge by teacher trainees and highlights the social nature of learning. Thus, after presenting the transition from Constructivism to Constructivism, we will relate the latter to the context of microteaching and draw conclusions on how we could relate this practice to the theory of Constructionism.

Constructionism as a reaction to constructivism

From Constructivism to Constructionism: An attempt, therefore, to achieve interaction between the learner and his environment and to enhance the learner's involvement in the learning process was also made by Piaget's student Seymour Papert (1928-2016), who, criticizing the Constructivist approach, developed the theory of Constructionism. According to the latter, students should create physical objects to practice what they have learned and experience the results tangibly, while engaging in the production of the construction of knowledge, so that this approach can be considered as learning through construction [24]. Knowledge is constructed where complex problems and real issues arise in learning environments and, in particular, where learners are engaged and involved. For Papert, knowledge is an essential foundational element in the context of learning and is shaped by product design. Thus, the more learners design, think and rethink creations, the more they learn and sharpen their

thinking and enhance their knowledge, which is a developmental process in Papert's view [1]. That is, within constructionism, the learning that develops in students' thinking is placed in the context of creating products and not exclusively in the learning process itself, thus suggesting that learning should take place in a physical and tangible way, not just cognitively, as constructionists believe [1]. This Papert's approach to learning, according to researchers such as Ackermann, (2001), helps us to understand how ideas are formed as a result of cognitive learning. Also, Papert attributed the difficulty in understanding basic concepts to the inadequacy of education to utilize materials that would make an idea or concept simple and concrete [25]. However, constructionism offers a fertile ground for promoting the concreteness of knowledge since "when we construct objects in the world, we engage with them and the knowledge required to construct them, so it is very likely that we will make that knowledge concrete" [32]. This positioning makes learners as active constructors of their own knowledge as they engage in making objects using a range of materials. These artefacts become the 'objects with which they think' [24], and support the development of specific ways of thinking and learning about concepts and practices [5]. Thus, engaging with them cultivates the ability to manipulate these objects, make continuous adjustments and improvements, or experiment [8]. From the above assumptions, it can be understood that constructionist (constructionism) learning environments are those environments that facilitate activities involving the construction of new knowledge. Bers et al. (2002) have referred to four key principles that underlie the spirit of constructionism: "(a) learning through designing projects that are shared with the community, (b) using concrete objects to construct and explore the world, (c) identifying powerful ideas that are both individually and epistemologically significant, and (d) the importance of self-reflection as part of the learning process" (p. 123), [6]. In summary, constructivism is based on the idea that learning takes place when objects are designed, so that knowledge is not only built upon prior knowledge in the minds of students, but also exists tangibly as evidence of learning [3].

Shift to Social Constructionism: This pedagogical innovation promotes the autonomy of the student and the redefinition of the role of the teacher, with all the consequences of this positioning of the student from the periphery to the centre of the processes of action and construction. As we can see, constructivism places great emphasis on objects apart from their maker, which can be presented, discussed, examined, tested and admired. Thus, sharing a creation can result not only in its refinement, but also in gaining a deeper understanding of other perspectives [17]. In particular, constructionism holds that meanings are produced anyway to some extent outside the control of an educator or the sequencing of an activity. Therefore, when designing educational activities, instructional intervention can only aim to create an environment rich in opportunities and challenges for the production of any meaning. [20]. Such an environment requires opportunities for collaboration and social interaction, concepts to which the dimension of Social Constructionism refers. In later articles, Papert emphasizes that knowledge is best constructed in a social context in which participants create something that can be shared. This view is consistent with the theories of Vygotsky, Lave, Wenger and others [10] and adds a social dimension to Constructionism. Social Constructionism is an important model of social analysis, which emerged from the

1970s onwards as an alternative way of thinking about the social world with the dominant concept of social construction [21]. It is a broader theoretical orientation, which offers an alternative perspective on social research and feeds various contemporary alternative approaches to the study of socio-psychological phenomena [4,11]. A key assumption of Social Constructionism is the dynamic interaction between knowledge and social action. Knowledge about the world is the result of human interaction and a set of intersubjectivity shared meanings, relations and practices and is constructed and reconstructed through social interaction [15]. A set of ideas, meanings, values and practices constitute the knowledge that is embodied in our personal identity, while at the same time feeding and being fed by our social action [7].

Thus, in an informal social environment what we call "social consistency, a sense of belonging to a group and a sense of common purpose" is created. Similarly, in an educational environment such as a school, constructionists focus on how the social context enhances the building of connections with what is learned. Papert has highlighted the critical role of the cultural context in building internal cognitive structures by pointing out that surrounding cultures can inform and facilitate Piagetian constructivist (constructivism) learning [25]. Finally, another view stemming from Social Constructionism is Distributed Constructionism, according to which learning is not an exclusive goal, but is mediated by resources present within the learning environment. Thus, knowledge is distributed through the tools/resources that exist in the environment and are the means by which student's access and understand the environment. Therefore, learning is a cycle of cognitive development that occurs as a result of relationships between individuals and other knowledge networks. It was based on the idea that learning should be viewed "not as a property of an individual, but as a process of interaction with others and the environment" [26]. From the literature review, it is evident that the constructionist approach is very often found in digital technology and computational thinking environments. Neofytidis and Ioannou point out in their article that Papert was the first to try to integrate programming into the classroom by creating the Logo programming language so that children of all ages could learn to program. Also, Papert was the first to use the term Computational Thinking (CF) and showed the importance of the ability to think computationally [23]. However, we can also identify relevance with other educational environments and in particular with that of Teacher Education. In particular, an attempt will be made to relate Micro – teaching practices, as a technic of Teacher Education, to the Constructionist learning perspective.

Elements of Social Constructionism in the Context of Microteaching for pre-service teachers

The practice of microteaching is a teaching technique applied in many academic institutions around the world preparing teacher candidates to become familiar with real classroom dynamics [16]; [22]; [14]. Allen and Ryan define microteaching as an instructional practice that provides a teaching environment that familiarizes teacher trainees with situations encountered in a regular classroom. Through this process the teacher candidate receives extensive feedback [2]. More specifically, microteaching is a 5 to 30-minute laboratory exercise, depending on the model followed at the time, in which the teacher candidate teaches a limited teaching unit to a small audience of fellow teacher trainees in order to familiarize

them with specific teaching skills and to acquire pedagogical approaches. A key element of the micro-teaching is its video recording, so that, in addition to the trainees, the teacher is able to observe him/herself on video as a teacher immediately after the teaching has taken place or later and reflect on it. The viewing is followed by comments and judgments from the trainees and the supervising educator [30]; [19]; [9]. It was already mentioned that constructionism is particularly applicable to learning through digital technology, since Papert, himself, argued that "If you can use technology to make things, you can make very interesting creations and learn a lot more by making them"[10]. If we take into account that in the practical exercises of the Micro-teaching exercises, teacher trainees are encouraged both in innovative uses of technology and in creating interactive learning environments, we find elements of the above theory in these teaching exercises. Also, can Microteaching be strongly associated with the social aspect of Constructionism. We have seen that Constructionism focuses on the social nature of learning, noting that activities such as making, building, or programming, through which the pre-service teachers produces objects that others can see and judge, provide a rich learning environment. Artifacts are a means by which others can engage in the thinking process while the student's thinking benefits from multiple perspectives and discussions [8]. Similarly, in micro-teaching, through the feedback and re-assessment that takes place, each student's thinking is expanded, enriched with peer ideas and supervisor suggestions on the unit taught and a teaching scenario is 'produced' which promotes meaningful criticism and discussion. This was confirmed by research in which studying the outcomes of microteaching for teacher trainees under the lens of social constructionism, found that there were significant benefits for students who learned in group work, or solved problems collaboratively and - in the context of microteaching - received feedback from their peers [13].

At the same time, according to Social Constructionism, through feedback or group discussions, learners are encouraged both to articulate their thinking and to understand and integrate the views of others. In this way, artefacts or 'objects for thought' provide a link between sensory and abstract knowledge and between the individual and the social world. Furthermore, shared knowledge is constructed when artefacts and shared understanding, linked through cycles of representation and interpretation using a gradual spiral approach, by engaging in discussions around their own artefact or someone else's artefact in each cycle, developing a shared understanding [8]. This process is also found in Microteaching, where students collaborate, exchanging views on both their own teaching and that of their peers, ultimately developing a shared understanding of each teaching method used. This collaboration with others reinforces the Connectionist nature of group planning discussions [13]. Subsequently, the Social Constructionist approach is concerned with social-cognition, i.e. enhancing learners' awareness of group learning processes through which basic skills are cultivated that are recognized as essential to any shared learning process. Learners should acquire collaborative work skills such as organizing, discussing, seeking and offering help from peers when needed [20]. Similarly, and in micro-learning, group work is highly utilized, organization, searching for appropriate resources and information for each "micro-learning" is required, and the development of critical thinking, motivation, collaboration and communication skills among participants is highlighted [28]. Nugrahenny T.

Zacharias (2016) also reports, in a research conducted under the light of Social Constructionism, that students at an Indonesian university, for their micro-teaching requirements, compose and create their own materials to familiarize students with their subject matter. However, the fact that none of the student-teachers use "ready-made" teaching materials, but are willing to spend considerable time and energy to create teaching materials appropriate to each situation, probably also suggests the extent to which they actively construct their identities as material creators [33].

Conclusion

In summary, we would say that Papert's main claim is that learning and idea formation are art forms. Thus, by creating and working with objects, artefacts and tools, whether they are documents, software tools or media that 'lead' to a final product, learners are involved in the development of the learning process and in continuous learning activities [12]. All this is relevant to teacher education and can also be approached within the context of microteaching. Since Social Constructionism argues that learning is very effective when we build something for others to experience and this can be anything, similarly in the context of a Micro-teaching, the way of "structuring" and implementing a micro-learning in a group of co-teachers creates a social knowledge environment. In this, groups construct knowledge for each other, collaboratively creating small teaching objects by synthesizing shared meanings [27].

REFERENCES

1. Ackermann, E. (2001). Piaget's constructivism, Papert's constructionism: What's the difference. *Future of Learning Group Publication, 5(3),* 438. Retrieved on18/12/2022 from http://www.sylviastipich.com/wp-content/ uploads/ 2015/04/Coursera-Piaget-_-Papert.pdf.
2. Ackermann, E., 2010. Constructivism(s): Shared roots, crossed paths, multiple legacies. In: *Pro-ceedings of the Constructionism 2010 conference. Paris, France 16-20 August 2010.* Paris: American University of Paris.
3. Alanazi, A. (2016). A Critical Review of Constructivist Theory and the Emergence of Constructionism. *American Research Journal of Humanities and Social Sciences, V 2,* 1-8 Retrieved on 18/12/2022 from DOI: 10.21694/2378-7031.16018.
4. Alvesson, M. & Sköldberg, K. (2009). *Reflexive Methodology. New Vistas for Qualitative Research.* (2nd Ed.). Thousand Oaks, California: SAGE Publications Ltd.
5. Brennan, K., & Resnick, M. (2012). New Frameworks for Studying and Assessing the Development of Computational Thinking. *Proceedings of the 2012 Annual Meeting of the American Educational Research Association,* V1, Vancouver, 13-17 April 2012. Retrieved on 18/12/2022 from http://scratched.gse.harvard.edu/ct/files/AERA 2012. pdf.
6. Bers, M. U., Ponte, I., Juelich, K., Viera, A., & Schenker, J. (2002). Teachers as designers: Integrating robotics in early childhood education. *In Information Technology in Childhood Education Annual V2002 (1), p123-145.* Retrieved on 26/12/2022 fromhttps://eric.ed.gov/?id=EJ82 3468.

7. Burr, V. (2003). *Social Constructionism* (2nd ed.). London: Routledge.

8. Butler, D., Leahy, M. (2021). Developing preservice teachers' understanding of computational thinking: A constructionist approach. *Br J EducTechnol, V52*, 1060-1077. Retrieved on 12/1/2023 from https://berajournals. onlinelibrary.wiley.com/doi/10.1111/bjet.13090.

9. Γιαννακοπούλου, Ε. (2008). Η μικροδιδασκαλία στην εκπαίδευση εκπαιδευτών ενηλίκων: Από την ανατροφοδότηση στον αναστοχασμό. *Εκπαίδευση Ενηλίκων, 14, 11-16.*

10. Cannings, T. Stager, G. (2003). Online Constructionism and the Future of Teacher Education. In Conference: *ICT and the Teacher of the Future, held at St. Hilda's College,* The University of Melbourne, Australia 27th–31st January, 2003. Retrieved on 9/12/2022 from https://crpit.scem. westernsydney.edu.au/confpapers/CRPITV23Cannings.pdf.

11. Clinton, G., Rieber, L. (2010). The Studio experience at the University of Georgia: an example of constructionist learning for adults. *Education Tech Research Dev, V 58,* 755–780. Retrieved on 26/12/2022 from DOI 10.1007/ s11423-010-9165-2.

12. Cooke, N. A., & Beckett, E. (2016). Training library professionals to teach: a study of new jersey train-the-trainer. *IConference 2016 Proceedings.*

13. Crichton, H., Gil, V. F. &Christine Hadfield. (2021). Reflections on peer micro-teaching: raising questions about theory informed practice. *International and Multidisciplinary Perspectives, V 22, (3),* 345-362. Retrieved on 24/1/2023 from https://doi.org/10.1080/ 14623943.2021.1892621.

14. Danday, B. (2021). Advancing Preservice Physics Teachers' Critical Thinking through Active and Passive Microteaching Lesson Study. *International Journal of Learning, Teaching and Educational Research., Vol20(3),* 205-228. Retrieved on 20/10/2021 from https://doi.org/ 10.26803/ijlter.20.3.13

15. Danilewicz, W.Korzeniecka-Bondar, A., Kowalczuk-Walędziak, M. LauwersG. (2019). *Rethinking Teacher Education for the 21st Century: Trends, Challenges and New Directions.* Opladen:Verlag Barbara Budrich. Retrieved on 15/2/2023 from https://search.ebscohost.com/ login. aspx?direct=true&db=nlebk&AN=3088708&site=eds-live.

16. Fernandez, M. L. (2005). Investigating how and what prospective teachers learn through microteaching lesson study. *Teaching and Teacher Education Vol 26*, 351–362. Retrieved on 20/10/2021 from www.elsevier.com/locate/tate

17. Fino C. N. (2017). Constructionism and the Shifting from Didactics to Mathetics. *International Journal of Development Research*, 07(10), 16250-16255.Retrieved on 20/1/2023 from http://www.journalijdr.com.

18. Κόκκος, Α. (2016). "Εισαγωγικό Σημείωμα". Στο Α. Κόκκος (Επιμ.). *Ο τρόπος που μαθαίνουμε: Οι πολλαπλές διαστάσεις της Μάθησης στην τυπική και άτυπη εκπαίδευση.* Αθήνα: Μεταίχμιο.

19. [Κουγιουρούκη, Μ. (2003). *Ο ρόλος της Μικροδιδασκαλίας στο πλαίσιο της Εκπαίδευσης και της Επιμόρφωσης των εκπαιδευτικών.* Θεσσαλονίκη: Αφοι Κυριακίδη.

20. Kynigos, Ch. (2015). Constructionism: Theory of Learning or Theory of Design? In *Selected Regular Lectures from the 12th International Congress on Mathematical Education, 417–438.*Retrievedon18/1/2023 from DOI: 10. 1007/978-3-319-17187-6_24.

21. Μαυρίδης Η. (2015). Για την "κατασκευή" της κοινωνικής πραγματικότητας: μετα-φαινομενολογικες προοπτικές του κοινωνικού κονστρουξιονισμου. *Επιστήμη και Κοινωνία: Επιθεώρηση Πολιτικής και Ηθικής Θεωρίας, 15,* 197–228. Retrieved on 21/1/2023 from https://doi.org/ 10.12681/sas.599.

22. Msimanga, M., R., (2020). The Impact of Micro Teaching Lessons on Teacher Professional Skills: Some Reflections from South African Student Teachers. *International Journal of Higher Education 10(2),164.* Retrieved on 20/10/2021 from DOI: 10.5430/ijhev10n2p164.

23. Νεοφυτίδης, Ν. Ιωάννου, Α. (2018). Ενσωμάτωση του προγραμματισμού στη διδασκαλία μαθητών έκτης δημοτικού και η επίδρασή του στην υπολογιστική σκέψη. *11th Pan- Hellenic and International Conference "ICT Education",19-21 October 2018.* Thessaloniki: EKT.

24. Papert, S., &Harel, I. (1991). Situating constructionism. *Constructionism*. Ablex Publishing Corporation. Retrieved on 18/12/2022 from https://pirun.ku.ac.th/ ~btun/papert/sitcons.pdf

25. Parmaxi, A., Zaphiris, P. (2014). The Evolvement of Constructionism: An Overview of the Literature. In P. Zaphiris, A. Ioannou (Eds.), *1st International Conference on Learning and Collaboration Technologies,22-27 June 2014*(pp. 452–461). Iraklion Crete: Springer.

26. Rogers, Y. (2006). Distributed Cognition and Communication. *Encyclopedia of Language & Linguistics (Second Edition), 731-733.* Retrieved on 22/1/2023 from https://doi.org/10.1016/B0-08-044854-2/00862-2.

27. Rudhito, M. (2018). Using Exelsa Moodle to Develop Mathematics Teaching Skills and Spirit in the Micro teaching course.*International Journal of Indonesian Education and Teaching, V2(2),* 177-186. Retrieved on 26/1/2023 from https://doi.org/10.24071/ijiet.v2i2.1175

28. Stigmar, M. (2016). Peer to peer teaching in higher education: A critical literature review. *Mentoring & Tutoring: Partnership in Learning,* V24(2), 124–136. Retrieved on 22/1/2023 from https://doi.org/10.1080/ 13611267.2016.1178963.

29. [29] Χαρίση Α., (2017). *Από την Κριτική Συνειδητοποίηση στην Αλλαγή; Η Εμπειρία μιας Ομάδας Αμοιβαίας Μάθησης Εκπαιδευτικών.* (Διδακτορική Διατριβή, Πανεπιστήμιο Ιωαννίνων, 2017). https://olympias.lib.uoi.gr/jspui/ bitstream/123456789/28141/1/%ce%94.%ce%94.%20%ce %a7%ce%91%ce%a1%ce%99%ce%a3%ce%97%20%ce% 91%ce%98%ce%97%ce%9d%ce%91%202017.pdf

30. Χατζηδήμου, Δ. (1997). *Η μικροδιδασκαλία στην εκπαίδευση των εκπαιδευτικών. Μια θεωρητική και εμπειρική προσέγγιση.* Θεσσαλονίκη: Αφοι Κυριακίδη.

31. Χατζοπούλου, Κ. (2014). *Διερεύνηση των διαδικασιών μύησης των υποψήφιων εκπαιδευτικών στο στοχασμό κατά την περίοδο της πρακτικής άσκησης.* Διδακτορική Διατριβή. Πανεπιστήμιο Θεσσαλίας, Βόλος.

32. Wilensky, U. (1991). *Feedback, Information, and Domain Construction.* Unpublished paper. Cambridge, MA: MIT Media Laboratory. In I. Harel & S. Papert (Eds.) Constructionism. Norwood N.J.: Ablex Publishing, Retrieved on 21/12/2022 from http://ccl.northwestern.edu/ 1997_prior/Wilensky_AbstractMeditations.pdf.

33. Zacharias, T.N. (2016). Exploring identity construction of student teachers practicing ELF pedagogy in a microteaching course. *Journal of Asian Pacific Communication, V26, (2), 321-339.* Retrieved on 26/1/2023 from https://doi.org/10.1075/japc.26.2.08zac.

****