

## Constructive Learning Theory: Exploring the Possibilities for this Interactive Teaching Learning Methods in Physiotherapy Education

Swati Meshram\*

Terna Physiotherapy College, Nerul, West, Maharashtra, India

\*Corresponding author: Swati Meshram, Terna Physiotherapy College, Nerul, West, Maharashtra, India, Tel: 022 2772 0563; E-mail: [swaticmin@yahoo.co.in](mailto:swaticmin@yahoo.co.in)

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### Abstract

This commentary discusses the significance of application of Constructive learning theory (CLT) in physiotherapy education. It relates a reviewed article based on examining the values and strategies of CLT in physiotherapy education and practice. The proposition for the use of this unexplored theory for its application in physiotherapy education was sound and innovative. Yet certain critical areas required an explicit explanation to strengthen the future enlistment of CLT in physiotherapy education.

Although the original article was a review, certain serious issues were noted in the submitted manuscript where author had discussed only theoretical aspects without any backing of evidences or providing any ground to strengthen the rationale for its use in field of health sciences and furthermore in the field of physiotherapy.

The strategies to conceptualize the Constructive learning theory in advancing the education and ultimately clinical practice in education model needed to be highlighted.

Hence this short commentary aims to provide an understanding of this novel theory and a basic ground for the future inspection and relevance to health education, especially in the field of physiotherapy. Also, this commentary attempts to bridge a gap between the theoretical aspects of CLT and possibilities of its adoption on the basis of evidences for the compatible area of physiotherapy education model and curriculum. The commentary focuses to acquaint the readers about the theory and its adaptation in varied educational fields with the substantial research evidence base. The objective of this commentary is to encourage the potential researchers to undertake and employ this theory with pertinent study design to provide an evidence base for its persuasion in the field of physiotherapy.

### Introduction

The constructive theory has been said to be consonant with the action theory [1]. Contrary to the traditional belief that learning takes place before acting, action theory believes that activity (sensory, mental and physical) occurs prior to learning. It assumes that mind and body are inter-related. Hence, knowing can only take place in context of doing. Activities are complex and interactive, which necessitates a collaborative effort. This has been explained with an example that how activity is the product of inter-relatedness and is independent of the individual. In a piano concert; manufactures, designers and builders involved in buildings the concert hall and accompanying orchestra. This all the extra elements are engaged for the successful concert [1].

In Constructive Learning Environments, (CLEs) it is necessary to study in situ practices that we hope to simulate in the learning environment [2].

CLEs consist of several inter-dependent components: a problem-project space, related cases, information resources (literature, media etc.), cognitive tools, and conversation and collaboration tools [3].

The focus of this commentary is to provide a basic understating of constructive learning theory to the readers. The objective is to provide health education providers to understand the significance of the constructive learning environment (CLEs) in training the health care

professional in practical case based scenario. As discussed further throughout the paper, on very few occasions this theory has been tested through actual experimental conditions, rarely in health education. More so, till date none of the data available so as to provide an insight for possible application of this theory in the field of physiotherapy teaching and practical learning.

It is true that this theory is neither novum nor that it has not been explored before. But it has been very rarely experimented in health education context and never so in the training of physiotherapy students. Through this paper an attempt is made to highlight the possibilities of application and employment of this teaching learning method to improve the student's understanding into patient's problems and further problem solving.

Since, physiotherapy practice and therapy deals with improving quality of life (QOL), students are required to understand patient problems not only in the context of structural change but functional change and patient's difficulty in carrying out daily life activities (ADLs). This requires a though understanding on the part of student about of patient's problem in the context of environmental situations. This is likely to improve his decision making to undertake appropriate treatment measures. This further requires an in-depth insight in understanding of patient's requirements and actual restriction imposed by the disease process regaining the functions. The understanding of this factors underlies an effective interaction and communication with that particular patient or his care takers. This

analytical skill and decision making of student depends on the practical understanding of the patient's problems which in turn requires an effective interaction. This however cannot be taught with the methods which are based on classroom teaching. If students are provided an opportunities to explore their own way of establishing the effective communication and applying the onsite knowledge based on the previous experiences or theoretical literature reading, understanding of the problem based approach can be effectively facilitated. This has to take place under the constant guidance and direction of the teacher or expert instructor whose role is to facilitate and let student explore his own string to reach the final intended goals. Expertise required for clinical reasoning and decision making with problem solving approach can then be achieved with incorporation of this underexplored teaching learning method in the field of physiotherapy practical learning.

Through this commentary author wants to take this opportunity to highlight constructivists learning theory and provide a basic framework for its possible application in the field of physiotherapy as well. Hence, encouraging and providing a stimulus to potential health education researchers in the field of physiotherapy to consider it for further exploration and providing the evidences and setting the guidelines for physiotherapy teaching in the interactive and constructive learning environments.

In order to accomplish the objectives of learning through CLEs an in-depth understanding of this components is mandatory for the teachers or instructors prior to embodying CLEs for any of teaching activity

Certain components of CLEs [1] are explained with incorporation of appropriate life examples to lay a foundation for further understanding of constructive learning theory in field of physiotherapy.

**Problem-project space:** In CLEs the problem-project space presents a learner with a problem in form of physical context, the actors and stakeholders, and the organizational and cultural climate.

For example; a patient with an episode of acute low back pain with neurological deficit admitted as an inpatient for the institution base rehabilitation services.

This case scenario would then provide a challenge for the learners. Hence, students are presumed to bear the responsibility of a problem and attempt to affect or manipulate the problem in some important way [1].

**Related cases:** related problems in CLEs enable learners to examine prior experiences and relate them to the current problem. This exposes student to multiple perspectives or approaches to the problems or issues. This can be an important element if learning through case series is employed. Also this can be used to facilitate learners understanding in establishing connection with the community at risk of suffering from the same health ailments.

**Cognitive tools:** for an instructor it is very important to identify the skills that are required to solve the problem and to provide a framework. This would help the learner to use his cognitive skills enabling him to perform those tasks. The frameworks should support the learner's exploration, articulation, and reflection in the environment [1].

For example, a problem should be compliant with a required level of student's skills of problem solving and complex enough to exhaust his capabilities to the core.

In contrasts to the traditional teaching methods where results are taken as the ultimate product of the learning, in constructivist's theory a process involved to attain those results is also given an equal importance [4]. Hence, not only what we know (K), but what we want to know, and what we have learned (L) but how we know it (H), is also important. Similarly, what are the evidences (E) to support our views and what are the new areas (W=wonderings) for further exploration. To employ the process an assessment based on KLEW (know, learn, evidence, wonderings) chart [5] can be followed.

In a scenario, where students have to diagnose and manage adhesive capsulitis in the final year undergraduate students. Students would think and already expected to know (K) that, Shoulder moves in three degrees of freedom, it has a capsule and ligaments. For the degree of freedom they are expected to know that, large amplitude of range of motion is the function of articular shape of bones in given degrees of freedom and hence shoulder joint allows for reach and overhead activities etc. What students are learning (L)? Adhesions in capsule can lead to movement restriction in capsular pattern which is altering the activities of daily living (ADLs), quality of life (QOL), etc. Student know this on basis of evidence (E) which means, how student know this? Whether they did some reading about it, followed internet, followed some published literature, their clinical encounters with patients, whether followed any research article, whether discussed with seniors etc. What are student's wonderings (W)? Students have come up with some further testable questions about the adhesive capsulitis etc. Emphasizing evidence may encourage students to gain more valid information through scientific investigations and understand the prospects of future research. The student can come up with ideas about modifications to existing investigations or designing the new tests. Hence, in CLEs students work in a group. Learning is interactive and starts with what students already knows. Teachers interacts with students and help them to construct their knowledge. During the entire process, the student competency, his observation, perspective, point of view is assessed along with the end product.

### Conversation and Collaboration Tools

CLEs encourages and demands the use computer conferencing, chats, UseNet groups, Multi-User Dungeons (MUDs), and Object Oriented MUDs (MOOs) to facilitate dialogue and knowledge building among the community of students or learners [3].

Unfortunately, Constructivists theory in teaching learning method has been less frequently employed in adult learning and still least used in health professional learning. Theory believes that knowledge is not taught but gained through real life experiences that interests learner, and sharing various perspective of their experiences with peers [6].

Constructivist's learning environment for the adults should provide an opportunity to students to determine a relation between new information and past knowledge about the problem through the analytic process. To accomplish this process facilitator or teacher can ask various questions to stimulate and guide the discussion and formulate an environment to stimulate the thought process.

For eg. A problem of movement abnormalities in a child suffering from cerebral palsy condition. Student's existing knowledge about this conditions, or the problems associated with the interaction of this

child in his social context can be discussed. The focus area can be limited depending upon the student grade. Similarly, teacher can facilitate the discussion to encourage a new insight in the students regarding what are the unknown or untouched aspects of the motor impairments in this child. Various point views of the student depending on his previous information can be discussed in variety of context such as interaction of child with parents and society or his limited participation. Students can contribute with their real life experience. Facilitator can bridge the gap for any misconception or any gap in the information or knowledge by intervening or asking some leading questions. Using this kind of strategies contributes to the critical learning environments where teacher “embed” the skills they are teaching in “authentic tasks that will arouse curiosity, challenge students to rethink assumptions and examine their mental modes of reality” [7].

Role of students has also been indemnified in this interactive CLEs. Students are expected to use their imaginations to redefine the problems from different perspectives and establish a connection between new material and previous experience, through discovery. To accomplish a meaningful learning a problem oriented discussion should be encouraged to make new discoveries in the current knowledge which teachers originally had intended. Teacher should constantly reframe questions according to learner’s current level of information and understanding of the subject. Objective is to make learners an autonomous and responsible thinkers. Educators must help learners to become aware and critical of their own and others’ assumptions [8]. The different tools are group projects, role play, case studies, and simulations are few classroom methods associated with transformative education.

## Discussion

Jonassen has given a process for applying activity theory for designing CLE’s which can be used as a framework for determining the components of the activity of any CLE’s [1].

Teachers can make learning meaningful when they employ activities that call on students to use their prior knowledge and experiences to construct their own frames of thought [9].

Through such inquiry learning approaches, students are exposed to the situations that demand critical thinking and give students an opportunity to express, confront, and analyze preconceptions and misconceptions in an active, nonthreatening way. A learning-cycle inquiry model has been evolved to promote learning through CLT. This consists of 3 phases such as exploration in which students address a problem and make hypotheses and predict solutions. In phase 2 Students and the teacher discuss the result of Phase 1. Teacher introduces new concepts through a mini lecture. In phase 3 Students use knowledge gained from Phases 1 and 2 to address a new problem [10].

Constructivist learning theory has been stated as an effective learning teaching method in school children, less frequently in adult learning and least in health education. Database search of PubMed resulted in 17 research articles when constructivist’s learning theory was used as the key word.

Whereas PEDro (physiotherapy evidence database) search did not result in any of the research article. All full text articles were obtained. Amongst this articles, theoretical aspects of constructive learning theory were discussed. One article was based on the application of

activity theory for designing the CLEs [1]. In other basic design course in terms of constructivist learning theory [11], Cognitive load theory vs. constructivist Approaches [12-14] were explained.

Application of Constructivist learning theory has been evaluated in the mathematics education [15,16].

Majorly theory has been used in nursing healthcare education [17,18] and nurse practitioner (FNP) students [19,20]. Also the theory has been analyzed as a teaching learning method in entry level medicine students to understand surface anatomy [21], in dental students to master the carving techniques [22] and in teacher education [21]. Theory has been conceptualized for the classroom teaching through internal enquiry [10] and to understand the impact of visual environment influences on Rational Complexity [23] in social work to Develop Core Competencies in performance [24]. Implantation of a software visualization tool (MFV-Class) for comprehension of a class of software engineers [25]. Only one article could be found on medical trainee education. This was called as MiPLAN model which was tested using CLT for the bedside teaching in inpatients setting. This three-part model was designed to enable clinical teachers to simultaneously provide care along with teaching the students [26].

Thus MiPLAN kind of strategic program can be constructed and evaluated as teaching model in training the physiotherapy students.

Physiotherapy teacher or instructor who is expert in area of content should be more familiar and alert to use education theories and apply them appropriately. As apparent from the search result of PEDro there exist a scope for incorporating the CLT and assessing the outcome of students in context of predefined frameworks or goals.

In Education practices, it has been difficult to generate good evidence for medical education practices, it seems even harder to translate this evidence into improving the quality of practice and outcomes [27,28].

In other words, there is a gap between educational researchers and users of educational research [29].

According to Best evidence medical education (BEME) individual teacher must translate research into practice when making decisions about his/her own teaching [30]. In other words, this gap between educational researchers and users of educational research [29] needs to be filled with the application learning theories in practical teaching area. The constructivist learning environment’s rejects the idea of learners as passive recipients of knowledge [31] and learning occurs in a real life like case scenario.

In the field of physiotherapy when entire curriculum is restructured and keep on reshaping to cope up with modern learning, teachers find it difficult to incorporate the teaching theories like constructivism in their teaching methods. And finally teaching largely comprised of teacher-centered instruction, especially which can have its deleterious effects on the learners during hands on practical session.

The use of the constructivist theory in physiotherapy teaching environment can be understood with one example. Teaching undergraduate physiotherapy students the practical aspects of handling the patients in the outpatient and inpatient department in Constructivist learning environment.

A prior discussion should be held on setting the learning goals. Teacher should strive to invite the expectations of the learners too. Short manuals or reference literature or guidance on the resources

referred by the institute can be provided. Students can be given a prior assignments about the relevant characteristics or examination findings or functional impairments of the condition which they can answer after the actual session is over. This can help mentally prepare students to be on alert or thoroughly pay attention to several areas during actual presentation session. For e.g. designing the goals for the learning about the motor impairments and movement dysfunctions in the patient suffering from Parkinsonism. During session of actual presentation, student's goals and purpose should be introduced to the patient or his relatives or caretaker or relevant person in charge of that patient. Teachers needs to be a patient listener and should interrupt least but should act as facilitator if discussing is not focused. This can be accomplished by asking relevant questions. During the session learner independently or with teacher examine the patients for the relevant content.

After the presentation teacher should strive to find out the opportunities for further information and correct the fault or bridge the gap in the information. This can take any of the forms such as clinical reasoning about the movement dysfunction, examination methods, further investigation, and communication with leaners. Learner can be asked to find out the updated practices and follow evidence base in the same areas. Teacher should solve the doubt of the learners or as implied by their answers. Teacher can also take decision about the classroom teaching for this topic or search further in literature which is likely to lead the discovery of different problems associate with same diagnosis in different patients etc. This list can be never-ending depending upon the goal setting or agenda and highly influenced by the grade of the target learners. Whole case can be summarize, practice sessions on the models can be invited, mock demonstration or role play can be arranged further for the kinesiolo-gical analysis. Decision regarding revisiting the same patient or new patient with improved information can then be taken up.

## Conclusion

Constructivist learning theory is an innovative interactive tool and stands a good scope for research in physiotherapy education. The approach warrants a thorough understanding and customized application to field with substantial application in the context of improving hands on experience of the learners in the field of physiotherapy.

## References

1. Jonassen DH, Rohrer-Murphy L (1999) Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research and Development* 47: 61-79.
2. Kuutti K (1991) Activity theory and its applications to information systems research and development. *Information systems research: Contemporary approaches and emergent traditions*.
3. Jonassen DH (1999) Designing constructivist learning environments. *Instructional design theories and models: A new paradigm of instructional theory* 2: 215-239.
4. Gupta S (2011) Constructivism as a paradigm for teaching and learning. *International Journal of Physical and Social Sciences*. 1: 23-47.
5. Hershberger K, Zembal-Saul C, Starr ML (2006) Evidence helps the KWL get a KLEW. *Science and Children* 43:50-53.
6. Piaget J, Inhelder B (1969) *The psychology of the child*.
7. Bain K (2011) *What the best college teachers do*. Harvard University Press.
8. Mezirow J (1997) Transformative learning: Theory to practice. *New directions for adult and continuing education* 74: 5-12.
9. Johnson JA, Dupuis VL, Murial D, Hall GE, Gollnick DM (1996) *Inrmducion to rhe foundations of American education*. (3rdedn), Allyn and Bacon Boston.
10. Bevevino MM, Dengel J, Adams K (1999) *Constructivist Theory in the Classroom Internalizing: Concepts through Inquiry Learning*. *The Clearing House* 72: 275-278.
11. Kocadere SA, Ozgen D (2012) Assessment of Basic Design Course in Terms of Constructivist Learning Theory. *Procedia - Social and Behavioral Sciences* 51: 115-119.
12. Vogel-Walcutt JJ, Gebrim J, Bowers C, Carper T, Nicholson D (2011) Cognitive load theory vs. constructivist approaches: which best leads to efficient, deep learning? *Journal of Computer Assisted Learning* 27:133-145.
13. Asal V, Kratoville J (2013) Constructing international relations simulations: Examining the pedagogy of IR simulations through a constructivist learning theory lens. *Journal of Political Science Education* 9:132-143.
14. Coupal LV (2004) Constructivist learning theory and human capital theory: shifting political and educational frameworks for teachers' ICT professional development. *British Journal of Educational Technology* 35: 587-596.
15. Dubinsky E, McDonald MA (2001) APOS: A constructivist theory of learning in undergraduate mathematics education research. *The teaching and learning of mathematics at university level: An ICMI study*.
16. Forster P (1999) Applying constructivist theory to practice in a technology-based learning environment. *Mathematics Education Research Journal* 11: 81-93.
17. Hunter JL (2008) Applying constructivism to nursing education in cultural competence: a course that bears repeating. *J Transcult Nurs* 19: 354-362.
18. Weeks KW, Lyne P, Mosely L, Torrance C (2001) The strive for clinical effectiveness in medication dosage calculation problem-solving skills: the role of constructivist learning theory in the design of a computer-based 'authentic world' learning environment. *Clinical Effectiveness in Nursing* 5: 18-25.
19. Jane Cook M (2012) Design and initial evaluation of a virtual pediatric primary care clinic in Second Life(\*). *J Am Acad Nurse Pract* 24: 521-527.
20. Lim AG, Honey M (2006) Integrated undergraduate nursing curriculum for pharmacology. *Nurse Educ Pract* 6: 163-168.
21. Bergman EM, Sieben JM, Smailbegovic I, De Bruin AB, Scherpbier AJ, et al. (2013) Constructive, collaborative, contextual, and self-directed learning in surface anatomy education. *Anatomical sciences education* 6: 114-124.
22. Kilistoff AJ, Mackenzie L, D'Eon M, Trinder K (2013) Efficacy of a step-by-step carving technique for dental students. *J Dent Educ* 77: 63-67.
23. Kalbfleisch ML, Debettencourt MT, Kopperman R, Banasiak M, Roberts JM, et al. (2013) Environmental influences on neural systems of relational complexity. *Front Psychol* 4: 631.
24. Fire N, Casstevens W (2013) The use of cultural historical activity theory (CHAT) within a constructivist learning environment to develop core competencies in social work. *Journal of Teaching in Social Work* 33: 41-58.
25. Zhang ZM, Pan YH, Zhuang YT (2004) MFV-class: a multi-faceted visualization tool of object classes. *J Zhejiang Univ Sci* 5: 1374-1381.
26. Stickrath C, Aagaard E, Anderson M (2013) MiPLAN: a learner-centered model for bedside teaching in today's academic medical centers. *Acad Med* 88: 322-327.
27. Vernon DT, Blake RL (1993) Does problem-based learning work? A meta-analysis of evaluative research. *Acad Med* 68: 550-563.
28. Wolf FM (2000) Lessons to be learned from evidence-based medicine: practice and promise of evidence-based medicine and evidence-based education. *Medical Teacher* 22: 251-259.
29. Grant MHJ, Graham Buckley I R, Hart R (1999) BEME Guide No. 1: Best Evidence Medical Education. *Med Teach* 21: 553-562.

30. Hart RH, Ian (2000) Best evidence medical education (BEME): a plan for action. *Medical Teacher* 22: 131-135.
31. Tynjala P (1999) Towards expert knowledge? A comparison between a constructivist and a traditional learning environment in the university. *International journal of educational research* 31: 357-442.