



RESEARCH ARTICLE

LEARNING FROM ONE'S MISTAKES OR LEARNING FROM OTHERS:
TEACHING INTERNS CLUSTERING MODEL

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ABSTRACT

Internship or practicum phase is viewed by teaching interns as the most beneficial and valuable component of their training. What they learned throughout their undergraduate training is put to a test as they now practice and learn the rudiments of the teaching profession. Yet teaching interns (TIs) learn differently from each other and are grouped when they go to their respective school assignments. How do we group or cluster teaching interns in order to maximize teaching performance? Using an artificial world simulation found in the NetLogo software, this paper presents classroom grouping models for Piagetian and Vygotskiiian TIs using parameters such as zone of proximal development (ZPD), teacher distractions, and number of Vygotskiiian neighbors allowed for interaction. Piagetian TIs have been found to perform better in low ZPD, low teacher distraction, and limited number of Vygotskiiian neighbors. Vygotskiiian TIs on the other hand, have been found to thrive in high ZPD, high teacher distractions, and more Vygotskiiian neighbor levels. For an optimum teaching performance among Piagetian, Vygotskiiian and combined Piagetian-Vygotskiiian TIs in a cluster, ZPD levels and teaching distractions must be at a maximum level with predominantly Vygotskiiian TIs comprising the cluster.

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INTRODUCTION

The internship or practicum phase of teacher education is the culminating activity of a pre-service teacher. After three years of theoretical preparation and learning in college, the pre-service teacher is now ready to embark on a new challenge that puts everything that he/she has learned to the test. It is the most critical phase of teaching preparation (Bell and Robinson, 2004) and for the most part, it is a stressful and challenging period in the intern's professional development (Caires, Almeida and Vieira, 2012). But even during this phase, a lot of learning still occurs - learning that occurs from one's experience or learning from others through observation. That is why this phase is viewed by teaching interns as the most beneficial and valuable component of their training (Campbell-Evans and Maloney cited in Eksian and Yakisik, 2016) due to the abundant improvements and accomplishments that occur during the teaching practice (Caires, Almeida and Vieira, 2012).

In the internship phase, teaching interns are assigned to experienced mentors who assign the subjects that they will teach, check their lesson plans, and provide appropriate feedback on different aspects of the teaching-learning process that will help in their preparation as teachers. Pre- and post-conferences, either individually or as a group, are provided as avenues for teaching interns (TIs) to acquire more knowledge and skills that will help them in the teaching profession. Moreover, these mentors also provide avenues for TIs to develop collaboration through team-teaching and other active learning strategies in order to promote learning among them (Griffiths, 2010). The social dimension of a teacher is central to some main happenings that take place during initial teacher education (Caires, Almeida and Vieira, 2012). Each TI though has a particular learning style. Some TIs learn by actual performance and by learning from whatever errors they have committed in the process of performing their assigned teaching tasks. This follows the Piagetian Theory of Cognitive Development. McLeod (2015) discusses cognitive development, citing Piaget, as a progressive reorganization of mental processes that is a result of biological maturation and environmental experience i.e., the child's development comes before learning. On the other hand, Vygotsky views learning as a necessary and universal aspect of developing culturally organized human function.

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Moreover, he views social learning to come before development. He also emphasizes internalization as a process whereby a learner first encounters an experience in social setting then internalizes such experience so that it is integrated into the learner's mental functioning (Doolittle, 1997). Vygotsky puts forward the Zone of Proximal Development (ZPD) as an area where the most sensitive instruction or guidance should be given in order for learning to occur. Further, ZPD is viewed as the "difference between individual and cooperative performance" (Loyd and Fernyhough, 1990). These two theories of learning have quite an impact on the way TIs learn. For some, learning occurs by examining their own experience (Piagetian) while others learn by examining other learners' experiences in relation to their ZPD (Vygotskian). Still others use a combination of the two. With the interplay of these two theories and collaborative work in TIs, how does the composition of Piagetian and Vygotskian teaching interns in the classroom influence the improvement of their teaching performance? Under which classroom setting will Piagetian TIs perform better? Similarly, under which classroom setting will Vygotskian TIs perform better? Using the Complex Adaptive System framework, this paper seeks to provide answers to the questions posed and a model by which clustering or grouping of teaching interns can be made in order to maximize teaching performance.

Conceptual Framework: This study is anchored on the theory of Cognitive Development by Jean Piaget and Social Constructivism by Lev Vygotsky. Piaget was mainly concerned with individual development but he recognized that children's conversations among themselves had a part in cognitive development (Tudge and Rogoff, 1990). In Piaget's theory, a child is born with a very basic mental structure, genetically inherited and evolved, on which all subsequent learning and knowledge are based. In the case of teaching interns (TIs), this mental structure is further developed as they go through all the required courses prior to internship. Moreover, revolutionary changes can take place through the internship phase as it has been found out that significant cognitive development do carry on even well beyond the formal operational stage (Labouvie-Vief, 1980).

Vygotsky's theory, on the other hand, was based on the idea that to understand a child's individual development, his or her social environment must be taken into consideration (Tudge and Rogoff, 1990). It also explains how a learner first develops lower mental functions then through meaningful social interactions with more educated and experienced others are then able to acquire advanced mental functions. Also, Vygotsky's dynamic construct called the zone of proximal development (ZPD) addresses human learning whereby early on, a learner will greatly need assistance in achieving a task but with practice and experience will later on be able to undertake the task autonomously (Doolittle, 1997). True to teaching interns, their meaningful associations and interactions with their fellow mentees and more knowledgeable mentors will help them to undertake duties and responsibilities independently in the course of their internship phase. Shown in Figure 1 is the relationship of Piagetian, Vygotskian and combined Piagetian-Vygotskian learners in a classroom setting in the teaching internship phase. A teaching intern, while in the internship stage, is able to learn by using either Piagetian or Vygotskian principles, or both. Interns who learn from their own experience as they teach demonstrate Piaget's cognitive development.



Figure 1. Conceptual Framework of Piagetian, Vygotskian, and its Combination during Internship

Interns who learn by examining other interns' experiences display Vygotsky's social constructivism. While both theories of learning are utilized, some interns during the internship stage may also exhibit a combination of both.

Research Design and Methods: The study utilized one of the simulation models of NetLogo, a popular software for Artificial World Creation. Such simulation model is used in the analysis of a complex adaptive system. The specific model employed in this study is Piaget-Vygotsky Game. This model-based thought experiment was designed to create a single environment in which both "Piagetian" and "Vygotskian" learning are simulated. This is a psychology model in which agents "learn" through playing a game either as individuals, social interactors, or both. In this game, players stand behind a line in a row and each throws a marble, trying to land it as close as possible to a target line some "yards" away. They each roll a marble at a target line. Then, they adjust the force of their roll in case they undershoot or overshoot the line, and, on a subsequent trial, improve on their first trial. Three (3) learning models were simulated: Piagetian, Vygotskian, and Piagetian-Vygotskian. Piagetian refers to players who learn from their own previous attempts. Vygotskian are players who learn by observing other players, not from their own performance. Piagetian-Vygotskian are players who learn both from their own and from others experiences. Each player is associated with a teaching intern who can be Piagetian, Vygotskian, or Piagetian-Vygotskian. The other assumptions include the following shown in Table 1.

Table 1: Parameters and Values Used in Determining Agent Behavior

Original Parameter	Parameter as Used in the Study	Values Used	Remarks
Number of Players	Number of Teaching Interns	20	Constant
Attempts-per-Run	Times of Teaching	15	Constant
Strategy	Learning Mode	Piagetian, Vygotskian, P - V	
ZPD	ZPD	0, 30, 60	Low = 0 Middle = 30 High = 60
Move-Error	Level of Teaching Distraction	0, 15, 30	Low = 0 Middle = 15 High = 30
Number of Vygotskian Neighbors	Number of Vygotskian Neighbors	2, 10, 18	Low = 2 Middle = 10 High = 18

RESULTS AND DISCUSSION

The researchers assumed that 15 ticks of the program correspond to the minimum number of teaching demonstrations in one semester of teaching internship. A cluster is set to be comprised of twenty (20) teaching interns who take turns in teaching in the same classroom environment. Different combinations of the settings of the parameters, namely ZPD, level of teaching distractions and number of Vygotskiiian neighbors, are explored to determine which learning mode works better. It has been observed though that the combined "Piagetian-Vygotskiiian" strategy tends to be the best one as the software stipulated.

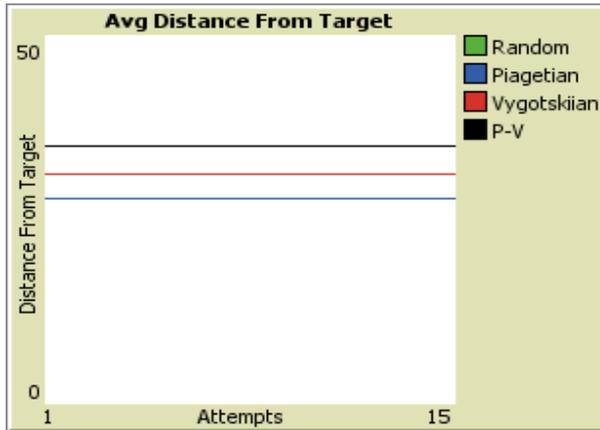


Figure 2. Teaching Performance based on Learning Mode at Low Parameter Levels

Two (2) Vygotskiiian Neighbors in Teaching Interns' Cluster: Shown in Figure 2 are the graphs depicting the average distance from target for Piagetian, Vygotskiiian and Piagetian-Vygotskiiian players. The horizontal straight lines show that at ZPD=0, Level of Teaching Distraction=0 and Number of Vygotskiiian neighbors=2, the average distance from target is constant or remains the same. Similarly for teaching interns who learn in these modes - Piagetian, Vygotskiiian and Piagetian-Vygotskiiian - their teaching performance stay the same or they perform at the same level as in their first attempt. As to distance from the target is concerned, the Piagetian players are closest to the target, followed by the Vygotskiiian then the Piagetian-Vygotskiiian. This is one scenario where the Piagetian-Vygotskiiian TI's have the lowest level of teaching performance. With a ZPD=0, there is no difference with what the learner can do with and without help. Hence, the Piagetian learners, who learn on their own, are able to achieve the highest level of teaching performance though there is no change in such performance in the subsequent attempts.

The Vygotskiiian learners meanwhile rank second to the highest and the last are the Piagetian-Vygotskiiian learners. Absence of teaching distraction would mean that their teaching is able to go on efficiently. Hence, there is no need for the teaching interns to change or improve their methods and strategies. According to Vygotsky, internalization involves the learner's active processing of an experience, modifying it based on past experiences and integrating such to change the old way of thinking (Doolittle, 1997). A smooth sailing teaching experience does not call for such kind of processing to take place causing no change in the performance as evident in the graph of a horizontal line.

The presence of only two Vygotskiiian neighbors has no impact on the Piagetian learners who learn on their own. These two Vygotskiiian learners though learn from the Piagetian and Piagetian-Vygotskiiian learners around them who apparently are performing better and worse than them respectively. Thus, they end up performing quite right in the middle.

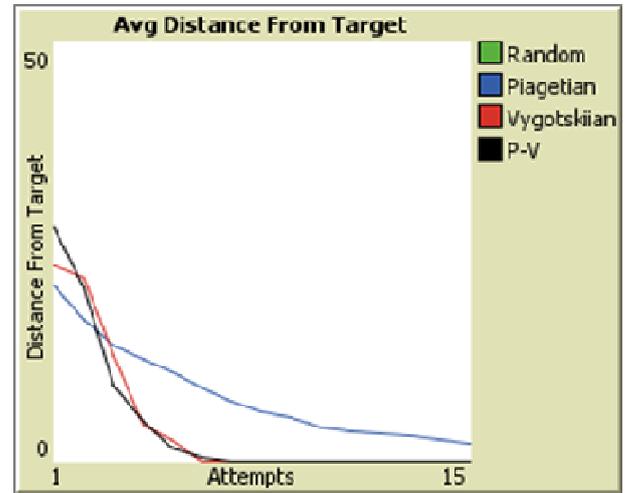


Figure 3. Teaching Performance based on Learning Mode at Middle Parameter Levels

Ten (10) Vygotskiiian Neighbors in Teaching Interns' Cluster: Figure 3 shows the graphs when ZPD = 30, Level of Teaching Distraction = 15, and Number of Vygotskiiian Neighbors = 10. These parameters are halfway the maximum allowable settings. In such set up and as the software have indicated, the Piagetian-Vygotskiiian mode tends to be the best one. At the fifteenth attempt, distance from target is close to 0. Likewise, P-V teaching interns in these parameter values end up with the best teaching performances as they learn both from themselves and from others. The figure reveals that at the first few attempts, the Piagetian learners perform better than the Vygotskiiian. However, in the long run, the Vygotskiiian learners perform better but a closer level of performance for Piagetian and Vygotskiiian learners at the fifteenth attempt can be noted in the figure. With ten Vygotskiiian learners in this set up and the ten others being Piagetian and P-V learners, the Vygotskiiian interns learn not just from their fellow Vygotskiiian learners but also from the others. With the P-V learners performing best, the Vygotskiiian learners are also able to learn from the methods and strategies that they are utilizing.

A ZPD of 30 refers to the difference between what the learners can do with and without help. Vygotskiiian learners then in this set up and proving true to their nature, learn best with the help of and by observing others. Such kind of teaching interns learn through interactions with others as they internalize their experiences and eventually utilize them to guide and direct their own behavior (Doolittle, 1997). A level of teaching distraction of 15 also goes to show that such distraction is an opportunity for Piagetian learners to learn and as they learn on their own, they improve their methods and strategies in teaching. Hence, the figure shows that their teaching performance is improving in the subsequent attempts. And the Vygotskiiian learners who learn from the Piagetian and fellow Vygotskiiian learners also improve in their teaching performance in the long run as Vygotsky believes that the objective of cognitive development is change in the individual learner (Doolittle, 1997).

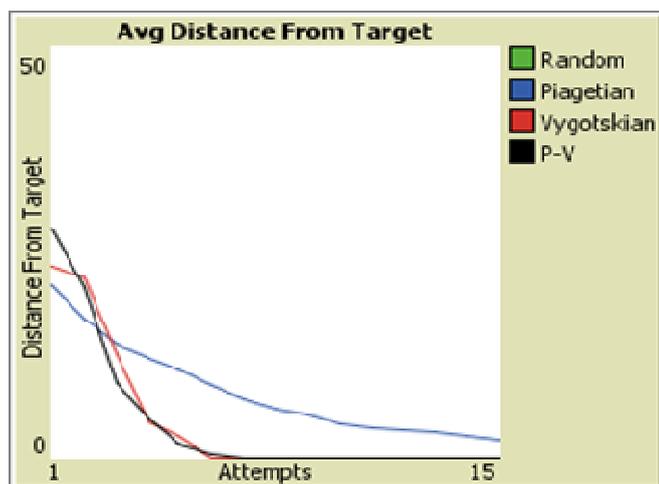


Figure 4. Teaching Performance based on Learning Mode at High Parameter Levels

Eighteen (18) Vygotskiiian Neighbors in Teaching Intern's Cluster:

Figure 4 shows the teaching performance of TIs based on learning mode at ZPD = 60, Level of Teaching Distraction = 30, and Number of Vygotskiiian Neighbors = 18. At this ZPD level, the difference between what the TI can do and what he/she cannot do without help is huge. As the TI learns and advances, his or her cooperative dealings with another individual, be it his/her mentor or fellow mentee, lead to the improvement of his or her teaching performance (Doolittle, 1997). The graph shows that the Vygotskiiian TIs as well as Piagetian-Vygotskiiian TIs tend to "close in" on the target which is maximum teaching performance. This can be further explained by the number of Vygotskiiian neighbors (18) made available for these TIs to interact with and the teaching distractions (30) that are presented to them. Upon presentation of more Vygotskiiian neighbors, Vygotskiiian TIs perform better because there are now more of them to interact with. More interaction among TIs with similar characteristics increase the attainment of a target goal despite several distractions presented to them.

Conclusion

The composition of Piagetian, Vygotskiiian and Piagetian-Vygotskiiian teaching interns assigned in the same classroom during teaching internship shows how Piaget's and Vygotsky's theories complement each other. How teaching interns with differing learning modes are clustered influence their teaching performance only in as much as the parameters (ZPD, level of teaching distraction and number of Vygotskiiian neighbors) are being set. Piagetian TIs tend to perform better when the distraction is low and when they only have a few classmates who are Vygotskiiian. Moreover, when the difference between what they can do and what they cannot do without help is null, Piagetian TIs tend to perform better than their Vygotskiiian peers.

Vygotskiiian TIs, on the other hand, tend to perform well even with a lot of distractions as long as they have peers who share the same characteristics and they are able to do more. Hence, for an optimum teaching performance among Piagetian, Vygotskiiian and combined Piagetian-Vygotskiiian TIs in a cluster, ZPD levels and teaching distractions must be at a maximum level with predominantly Vygotskiiian TIs comprising the cluster.

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