

DRAMA BASED INSTRUCTION AND GEOMETRY: HOW WORKABLE IN THE NIGERIAN EDUCATIONAL ENVIRONMENT

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Abstract

Drama based instruction allows students to improvise and construct a meaning of a word, concept, an idea, an experience or an event by the utilization of theatre techniques and the game process. Drama based activities creates an environment in which students construct their own knowledge by means of their experiences rather than imitating what is taught. In this paper, we reviewed the drama based instruction in the teaching of geometry, its development and use. We also presented the workability of the drama based instruction in the teaching of geometry in the Nigerian educational setting as well as its advantages compared to the traditional teaching method. Recommendations were made as well.

Geometry is an important area in the mathematics curriculum. It is used in other topics of mathematics and in daily life. It also has an instrumental role in other disciplines such as science and arts (Mammana & Villiani, 1998). Many studies have showed that students still have many difficulties in learning geometry and thinking geometrically (e.g Clements & Battissa, 1992; Mitchelmore, 1997; Mullisl, Martin, Gonzalez, Gregory, Garden, Connor, Chrostowski & Smith 2000, Prescott, Mitchelmore, & White , 2002; Ubuz & Ustin, 2003; Van Hiele, 1986).

One of the main reasons of the students' difficulties may be how the geometry topics are instructed (Clements & Battissa 1992). Several researchers studied the use of technology in the teaching and learning of geometry, from this point of view (e.g Chio- Koh, 1999; Dm & Whitson, 2001; Duaatepe & Ersoy, 2002); Groman, 1996; Kuntz, 1998; Labordee 2002; Ryan, 1999). Different methods other than the

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use of technology are hardly seen in the literature (Nichols & Hall, 1995; Granaty, 1998). The situation related with the studies in geometry brought the idea of finding different aid or teaching methods in geometry instruction. This paper reviews an alternative presentation of geometry; drama based instruction in geometry lesson proposed by Duatepe & Ersoy (2004).

Drama based instruction is an exploratory and experimental approach to learning. San (1996) defined it as an instruction method for allowing students to improvise and construct a meaning of a word, a concept, an idea, an experience or an event by the utilization of theatre techniques and the play processes, In this method, students construct their own knowledge by means of their experience rather than initiating what has been taught in the environment created (Bolton, 1986). Students are learning by doing and they actively build their interpretations of the word. In this method, the role of the teacher is the facilitator of students' exploration, development, expression and communication of ideas, concept and feelings rather than the direct information giver. Teachers can also control and guide activities, challenge and extend thought by taking role just as students (Wilhelm, 1998). By this way, they can be given immediate feedback when it is necessary.

The literature on the effects of drama on the cognitive domain revealed that, drama in education develops critical thinking skills (Bailin, 1998); De La Roche, 1993; Kelner, 1993; San, 1996), supports reflective thinking (Anderson, 2002), stimulates the imagination and promotes creative thinking (Bolton 1986; Hemig; 1988; Kelner, 1993; Morris, 2001; San, 1996), improves achievement in different content areas (Farris & Parke 1993; Kamen, 1992; Saab, 1988; Usundag, 1997), promotes language developments (Heinig, 1998. Kelner 1993), fosters decision making skills (De La Roche, 1993; San, 1996), promotes communication (Ballou, 2000, Bolton, 1985; Kelner, 1993) strengthens comprehension and retention (Kelner 1993; Southwell, 1999), promotes problem solving skills (Bolton, 1985; De La Roche, 1993; Heinig, 1988), and promotes ability to work cooperatively (Farris & Parke 1993; Kelner, 1993). On the other hand, studies concerning the effects of drama on the affective domain revealed that it provides sensory awareness (Heinig 1988; Bolton, 1998), brings confidence and enhances the students' self-esteem (Bolton, 1985), increases empathy and awareness of others (Heinig, 1998; Kelner, 1993; Yassa, 1997), reinforces positive self-concept (Farris & Parke, 1993; Kelner 1993). Apart from for Saab (1987) and Southwell (1999), none of these studies focused on the use of drama in mathematics education. Saab (1987) examined the effects of drama-based mathematics instruction on 87 sixth graders compared to textbook-oriented mathematics instruction. The results showed that drama based activities caused a significant increase in levels of mathematics achievement in regards mathematics computation. Attitudes toward mathematics and levels of creativity were not affected by the use of drama based activities. Southwell (1999), on the other hand, gave only examples of using dramatic moments to explore mathematics ideas, to challenge students and to develop conceptual understanding at the beginning, at the middle or at the end of the lesson.

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Considering these facts, developments of drama based lesson plans on geometry and investigation of their effects on students' geometry achievements, Van Heile geometry thinking level, and mathematics and geometry attitudes compared to the traditional teaching are appears necessary. The purpose of this review is to explain the developments of drama bases lesson plans on primary school geometry including angles, polygons, circle, and cylinder. Although the investigation of its effect is not the focused of this paper, the results of the experimental study carried out a state elementary school by using the lesson plans development showed that drama based instruction made a significant different to the students' achievement on geometry, Van Heile geometry thinking level, and mathematics and geometry attitude compared to the traditional teaching (Duatepe & Ersoy 2004).

The Development of the Drama Based Geometry Lesson Plan

Duatepe & Ersoy (2004) developed seventeen lesson plans (two of which are on angles, eight on polygons, five on circle and two on cylinder) were developed by considering drama based instruction criteria (social metaphor, make believe play, group work, students role, teacher role, warm- up activities , dramatic moments, drama techniques, quieting activities) (Anderson, 2002; Cotrell, 1998; Heimng, 1998 Neeland, 1990; Nixton, 1987, Mogan & Saxton, 1991; Tarlington, 19885; Taylor, 2000; Ustundag, 1997; Wilhelm & Edmiston, 1998). The lesson plans include three parts (i) introduction (warm-up activities), (ii) Development (introducing the dramatic moments and the improvisation of the dramatic moments by the students), and (iii) Quieting (evaluation of the lesson).

In the introduction part, to lead everyone goes in a relaxed mood, ready to work together in a harmony, trust each other and also have fun, warm- up activities were used. These activities also gave students some hidden clues about the rest of the lesson.

In the development part, dramatic moments were introduced in which students faces with the tension of time, an obstacle to overcome, mission to accomplish, or status to challenge. This tension forced them to remove the obstacles, or accomplish the mission in given time. In order to get rid of this tension, they had to create some ideas, discuss their ideas with their friends. In some lessons, the teacher participated in the activities by taking some roles in them. This helped the teacher to control the students and the teaching/learning process. It also provides more effective relationships between the teacher and students.

Finally, in quieting part, the key points of the concept covered summarized either by the teacher or by the students. Students reviewed what they had learned either by answering or solving the questions posed by the teacher or presenting what they have learned by creating a scenario that requires the use of knowledge learned (Duatepe, et al 2004).

The evaluation of lesson plan 11 in terms of the drama based lessons criteria appears in Table 1. by this lesson plan, student s were aimed to discover the shape formed by equidistant points from a certain point; to distinguish the interior and exterior region of a ring; to distinguish the ring and the circle in a lesion hour (40

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minutes). At the beginning of this lesson. The classrooms were organized to provide more space and then students were told that they were scouts going to the camping site in a forest. They were walking and singing in a line as if going to a scout camp. After a minute walking and singing, they were told that they have arrived the campsite and asked to stand provided that everyone sees each other (in the form of ring) and asked questions about what they had seen while walking to the camp. This part aimed to make the students ready for the rest of the lesson. Later, they were grouped into scout teams consisted of 7-8 scouts and introduced two dramatic moments; finding that how they should be positioned to get heat equally and finding the way of protecting fire and themselves from the rain while everyone gets heat equally from the fire. The first one aimed the students to understand that in order to get the heat equally they should be positioned in a ring form. The latter aimed the students to understand that in order to protect the fire and themselves from the rain while they were positioned in the ring form, they should use a shelter covering the interior s region of the ring and the ring itself, which is named as circle. At the end of the lesson, the students were asked to state the objects in the shape of ring and circle to form ring and circle, and to identify the positions of several objects that are put either interior or exterior region of that ring.

Table 1. The Evaluation of Lesson Plan 11 According to Drama Based Lesson Criteria

Social Metaphor	Analogy with a Scouting Camp Setting
Make Believe Play	The role of camping scouts
Group work	Working in group as scouts teams
Student role	Behaving as a scout in a camp, work on a problems scout facing in the camp like getting the unequal heat from the fire, protecting fire and themselves from the rain while getting equal heat
Teacher role	As a scout leader, facilitated to discover importance of being equ-distant from a point, and difference between ring and circle, asked questions, forwarding the students questions to the classroom like “Is a ball count as a circle?”, “Is every plate can count as a circle?”, “What properties should be satisfied in order to be a circle? .
Warm-up activities	Every students was walking and singing in a line as if going to a scout camp, talking in the role of camping scouts. Students standing provided that everyone see each other (in the form of ring) talking about the camp.

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Dramatic moments	Tension of the camping condition: Overcoming the obstacles of finding the way of getting the equal heat from the fire. Tension of the rain; finding the way of protecting fire and themselves from the rain while getting equal heat from the fire.
Drama techniques	Still image mantle of expert, role playing
Quieting activities	Students were asked to state five objects in the shape of ring and circle, asked about the positions of the objects put exterior or interior region of the circle

A mathematics teacher and three instructors in universities two of whom were specialized on dram in education and one on mathematics education checked all the lesson plans developed. These specialists on dram checked the lesson plan to determine whether they are appropriate as a drama based instruction. The mathematics instructor and the mathematics teacher examined the lesson plans to determine whether they a mathematically correct and appropriate to achieve the objective. Furthermore, all the lesson plans were piloted on six, seven or eight grade classed in a state elementary school to check whether the lesson plans could be applied in classroom setting, hoe the classroom setting should be arranged, whether given directions were clear, how the classroom management could be accomplished, whether the objective could be achieved. The pilot study (Duatope, 2004) also provided the researchers to gain experience about the lesson plan and how to use then in the classroom effectively. The first researcher conducted the pilot study but the classroom teachers were presented in the classroom. At the end of the lesson. Teachers gave some advices and suggested some modifications related with the flow of the lessons. The following conclusions and recommendations were taken in the consideration in order to revise the lesson plans to be in the main study.

- Additional drama techniques such as flashbacks were needed in order to enrich the lesson plans. Especially, teacher-in -role needed to use in most of the lesson when it is appropriate and necessary. For example, the lesson plan ll mentioned above the teacher took the role of scout leader. But in the piloting of the lesson plan the teacher had not taken any role.
- More dramatic moments were suggested to use in order to take the attention of the students
- Some breaks were needed and recommended either at the end of development or quieting part to give chance to students take notes.
- In some lesson clues were needed in order to plan the students to deal with the dramatic moments. For example, the students were given the dramatic moments related to finding the password to get off the Pentagon building. The password of the building was the sum of the

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interior angles of the Pentagon. When the students were not able to give the correct answer, they were given a clue such as "consider how many triangles can be drawn in that Pentagon".

- More relevant warm-up activities to the objective of the course should be created.

Implication

Drama based instruction is an effective and efficient way to teach geometry topics in the specified period of time given in the curriculum. With carefully developed lessons plans that consider the conventions of drama based instruction, mathematical correctness, and tested in a real classroom setting, this period promises an effective way of geometry teaching.

This method has a significant effect on students' immediate and delayed geometry achievement and Van Hiele geometric thinking level compared to the traditional teaching by engaging various types of learners, promoting students' imagination by improvising a concept or an even, and helping them to experience all aspects of the problem. The concept learning is facilitated and concepts become scientifically and personally meaningful, since drama links real life and mathematics (Anderson, 2000). Integrated use of cognitive and effective processes in drama based instruction might be another reason for this positive effect. (Saab, 1987).

Drama based instruction has a significant effect on mathematics and geometry attitude compared to the traditional teaching by promoting the development of new interest, decreasing students anxiety with the help of enjoying time during the lessons.

Drama based instruction improves self- confidence. As Yaffe (1997) found out, since the students are more active, always deals with their social environment, they get used to be expressing themselves and fear of making mistakes lessen.

Drama based instruction provide students with enhanced empathy and understanding the others as Annarella (1992), Heinig,(1998), Kelner, (1993), Neelands, (1990), and Yaffe (1997) stated. By gaining the ability to understand another's point of and emotions, students become more flexible and open to change.

In order to use drama based instruction in the mathematics classroom, teachers need to be trained on using drama in mathematics lessons. As mentioned by Saab (1987), it is important for teachers to see the applications of the use of drama- based lessons in specific contents. They may be given a chance to experience drama- based lesson in teacher preparation courses and in services teacher training programs.

For future studies, it is recommended that drama based lessons in other topics of geometry and mathematics should be developed. More studies in the drama based instruction should be conducted. For example, the effectiveness of drama- based instruction in mathematics should be tested in experimental studies. Besides interventional studies, qualitative studies should be carried out to provide an in- depth

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look into which particular properties of drama- based instruction support students' cognitive and affective characteristics.

Workability of Drama- Based Lesson in the Nigerian Education Environment

The effective implementation of this drama-based lesson will require the following:

- (i) Trained teachers in drama;
- (ii) Spacious classroom;
- (iii) Modified scheme to reflect the dramatic nature of the lessons.

In the Nigeria environment, it is no news that most primary school teachers have for many years yet to engage in training and re- training programmes. Even where training and retraining programmes are put in place, the lack of resource persons in this new area could hamper the effectiveness of this drama- based lesson. It is recommended that teacher training centers/ institution should be equipped to train mathematics teachers to be drama based.

Similarly, most classrooms in Nigeria are over-crowded with chairs, desk and pupils. Getting the space for dramatic moments will require movement of chairs and tables outside (that is where they are available). Worst more is the permanent fixing of chairs and desks to the floor in some schools, hence rendering the drama- based lesson impracticable. More class rooms are needed to built to decongest existing ones, chairs and desks should be such that are moveable The conventional/ traditional school scheme of work is not compatible with the drama-based scheme. Hence, a review of existing scheme is recommended to accommodate this drama-based scheme.

References

- Anderson, C. (2002). Thinking as and thinking about: cognitive and metacognitive processes in drama. In Bjorn Rasmussen & Anna - Lena Ostern (Eds), *playing betwixt and between: The IDEA Dialogue 2001*, Oslo, Landslaget Drama I Skolen.
- Annarella, L.A. (1992). *Creative drama in the classroom*. (ERIC Document Reproduction Service ED391206).
- Bailan, S. (1998). Critical thinking and drama education. *Research in Drama Education*, 3 (2), 145-153.
- Ballou, K.J. (2000). *The effects of drama intervention on communication skills and learning attitudes of at- risk sixth grade students*. Unpublished PhD Dissertation, Clemon University.
- Bolton, G. (1985). Changes in thinking about drama in education. *Theory in practice*, 24(3). 151-157.

Pristine

- Bolton, G. (1986). *Selected writing in drama education*, London: Longman.
- Bolton, G. (1998). *Acting in classroom drama: a critical analysis*, Staffordshire Tretham Books.
- Choi-Koh, S. S. (1999). A students' learning of geometry using the computer. *Journal of Educational Research*, 92 (5), 301-331.
- Clements, D.H, & Battista, M.T. (1992). Geometry and spatial understanding. In Douglas A. Grouws (Ed.), *Handbook of research mathematics teaching and learning*, McMillan Publishing Company: New York.
- Cotrell, J. (1987). *Creative drama in the classroom grades 4-6, teachers' resource book for theatre arts*, National Textbook Co: Lincolnwood.
- De La Roche, E. (1993). *Drama, critical thinking and social issues*, {ERIC Document Reproduction Services ED379172}.
- Din, F.S. & Whitson, J.M. (2001). The effects of using the TI92 + calculator as a demonstration device in geometry instruction. *Research*, ED458114.
- Duatpe, A. & Ersoy, Y. (2002). *The effects of using advanced calculator (TI-92/CA8RI) on learning transformational geometry*. Proceeding of 2nd international conference on the teaching of mathematics at the undergraduate level, University of Crete: Greece.
- Farris J. P., & Parke, J. (1993). To be or not to be: what students think about drama. *The clearing house*, 66(4), 231-34.
- Garrity, C. (1998). *Does the use of hands-on learning with manipulatives, improve the test scores of secondary education geometry students?* (ERIC Document Reproduction Service No. ED-422-179).
- Groma, M.W. (1996). *Integrating Geometry Skechpad into a geometry course for secondary education mathematics Major*. (ERIC Document Reproduction Service No. ED405817).
- Heathcote, D. (1986). A drama of learning: Mantle of the expert.. *Theory into practice*, 24,173-180
- Heinig, R.B. (1988). *Creative drama for the classroom teacher*. Prentice Hall, Inc: New Jersey.

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Kamen, M. (1992). *Creative drama and the enhancement of elementary school students' understanding of science concepts*, DAI-A 52/07, 2489.

Kelner, B. (1993). *The creative classroom: A guide for using creative drama in the classroom* Pre K-6. Heinemann Portsmouth: NH.

Kuntz, G. (1998). *Dynamic geometry* on www. (ERIC Document Reproduction Service No, ED427711).

Laborde, C. (2002). *The process of introducing new task using dynamic geometry into the teaching of mathematics*. Proceeding of the Annual Conference of the Mathematics Education Research Group of Australia Incorporated, (ERIC Document Reproduction Service No. ED470868).

Mammana, C. & Vinicio Villiani (Ed.) *Perspectives on the teaching of geometry for the 21st century*, Kluwer Academic Publishers, London.

Mitchelmore, M.C. (1997). Children's informal knowledge of physical angle situation learning and Instruction, 7,1-19.

Morgan, N. & Saxton, J. (1985). *Teaching drama a mind of wonders*. Heinemann Educational Books, Inc.

Morris, R.V. (2001). Drama and authentic assessment in a social studies classroom. *Social Studies*, 92(1), 41- 45.

Mullis I. V. S.; Martin M. O.; Gonzalez, E. J.; Gregory K.D. & Garden R.A O' Connor

K.M., Chrostowski S. J. & Smith T.A. (2000). *TIMSS International mathematics report: findings from IEA's repeat of the third international mathematics and science study at eight grade*, Chestnut Hill, MA: Boston College.

Neelands, J. (1990). *Structuring drama work, a handbook available forms in theatre and drama*. Cambridge University Press; Cambridge.

Nicholas, J.D. Hall, H. (1995). *The effects of cooperative learning on student achievement and motivation in a high school geometry class*. (ERIC Document Reproduction Service No. ED387341).

Nixon, J. (1998). *Teaching drama: a teaching skills workbook (focused on education)*. McMillan Education Ltd: London.

Prescott, A Mitchelmore, M., White, P. (2002). *Students' difficulties in abstracting angle concepts form physical activities with concrete material*. Proceedings

Pristine

of the Annual Conference of the mathematics Education Research Group of Australia Incorporated ED 472950.

- Ryan, W.F. (1999). *The effects of using the TI-92 calculator to enhance junior high students' performance in and attitude toward geometry.*(ERIC Document Reproduction Service No. ED436414).
- Saab, J.F. (1987). *The effects of creative drama methods on mathematician achievement, attitude and creativity.* Unpublished Ph.D Dissertation, West Virginia University, Morgantown.
- San, I. (1996). Yaraticiligi gelistiren biryontem ve yaratıcı bireyi yetiştiren bir disiplin: eğitsel yaratıcı drama. *Yen! Türkiye Dergisi*, 2 (7), 148-160.
- Southwell, B. (2000). Drama as communication. *Reflection*, 25 (1),
- Tarlington, C. (1985). Dear Mr. Piper: Using drama to create context for children's writing. *Theory into Practice*, 24,199-204.
- Taylor, P. (2000). *The drama classroom: Action, reflection, transformation.* Routledge/Falmer. London.
- Ubuz, B., & Ustun, I. (2003). *Figural and conceptual aspects in identifying polygons.* Proceedings of the 2003 joint Meeting of PME and PMENA, I, p. 328.
- Ustundag, T. {1997}. *Vatandaşlık ve insan hakları eğitimi dersinin öğretiminde yaratıcı dramaların erisime ve derse yönelik öğretici tutumlarına etkisi.* Unpublished PhD Dissertation, Hacettepe University.
- Van Hiele, P.M. (1986). *Structure and insight.* Academic Press: New York.
- Wilhelm,J.D. (1998). Not for wimps! Using drama to enrich the reading of YA literature, *Alan Review* 25(3), 36-40.
- Wilhelm, J.D., & Edmiston, B. (1998). *Imagination to learn: Inquiry, ethics and integration through drama.* Heinemann: Portsmouth.
- Yaffe, S. (1989). Drama as a teaching tool. *Educational Leadership*, 46 (6), 29-35