

THE EFFECT OF 7TH GRADE SCIENCE AND TECHNOLOGY CLASS ON CRITICAL THINKING SKILL AND SUCCESS WHEN TAUGHT WITH THE SUPPORT OF CREATIVE DRAMA

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Abstract: In this study, creative drama studies were adapted to science teaching, the implementations were made and it was controlled how this method affects students' critical thinking skills. The research was carried out in pretest-posttest pattern with experimental control group. Study group is composed of 47 students who are 7th grade. During the experimental processes of six weeks, beside MEB Science and Technology Program, eight creative drama workshops were carried out in teaching science and technology class. Only the plans that were created in accordance with the book were applied in control group. Achievement test of which validity and reliability studies were carried by us and Cornell Critical Thinking Skill Test were used for data collection. Unrelated samples t-test was applied in data analysis. Research results showed that creative drama studies in science teaching positively and significantly affect critical thinking skill which is one of the main purposes of science teaching. And the findings showed that creative drama workshops that had been used along with the class do not enhance students' success.

Keywords: Creative Drama Studies, Dramatization, Critical Thinking Skill, Creativity, Role-Playing

1. INTRODUCTION

If the recent researches are examined, we see that many of the proposed teaching methods are those in which teacher-student interaction is high, that are appropriate for students' individual development, that can help students access information directly, in which teacher is a guider but not an info-relayer, that provide students with multi-dimensional thinking environments and that rather give students responsibilities.

In traditional education, the individual is not in the center, therefore students are ineffective. All

roles are for teachers. However, modern education embraces a student oriented education. In this education, it is aimed that students develop not just cognitively but also sensorially, motionally and socially. And this approach of education is an approach based on the individual who has been imitating the people surrounding them since childhood, therefore has been adopting to new situations; in other words, who does not stop the need to play games. The difference between student oriented education and topic oriented education is that student oriented education is

seen as a process related to a person playing or watching games (Bolton, 1985).

Education systems of 21th century is not anymore deaf to the approaches such as education by experience, education by playing and the importance of senses and fun in education which have been advocated by philosophers for centuries. All these studies prove these justifications right. Raising individuals who are confident, have developed abilities of problem solving and decision making and critical thinking skill requires new methods and approaches as per to the needs of modern world. One of the approaches that are fit for these goals is creative drama (Bozdoğan, 2003).

If the purposes of the creative drama method are examined, it is seen that it was structured to add competence as the logic of the era to students and it is an appropriate educational method for today. Creative drama method aims to create creative individuals who can access information by themselves and use information in daily life, can express themselves, are successful in group studies, can think in a versatile way, are respectful and aware of the social environment, can use the opportunities effectively. We would like more people to be creative at a fast pace in today's society.

A creative person is the one who is free from rote-learning and cliché thinking forms and not contented with repeating things that are already known. A creative person thinks multi-dimensionally, embraces interdisciplinary and bias-free thinking as a doctrine, can make syntheses, tries to bring new thoughts and different, original and independent solutions (Kavcar, 2002).

Enhancing societies' quality of individual will be surely possible by enhancing the quality of educational systems. The purposes of educational systems in the world are organized according to the needs of individuals and societies. There is an effort to bring students in preferred behaviors on primary school or even preschool level. Turkish Educational System has been into a renewal process aimed at the needs of the era and society in recent years. For example, the scope of "Science and Technology" class was renewed through the changes in its purposes and anticipated method and techniques by the program that changed in 2005. If the renewed program of science and technology class is examined, it is seen that the qualities of the individual that is wanted to be raised resemble the qualities of the individuals that the era requires. The methods which will be used to bring these qualities have been renewed undoubtedly.

A great compatibility is observed between the qualifications that science and technology class brings students in and the purposes of creative drama method when these two are compared. This situation shows that creative drama method is appropriate for use in Science and Technology branch as in many other branches.

It is observed that different methods are not applied enough to bring students in the mentioned abilities in science and technology classes. In order to achieve the goals in MEB program, science and technology classes should be enriched, and students should be encouraged to be more active. In this research, this problem was noticed and there is an effort to define the results

that applying a different method in science and technology class will cause.

One of the most important problems of science and technology class is that it cannot be transferred to daily life unlike its purposes, that it cannot be realized that the information comes from the real life, that science is seen only as a class and does not come out of the class room and the information acquired is not used at right times (Yalım, 2003). The mentioned problem is yet to be solved, but there are still studies to eliminate it. If the mentioned problem was eliminated, students would realize that science is exactly what they experience when they boil water while cooking pasta or when they slide at the slide in the playground.

Another important problem of the class is that students struggle at the class and have the prejudice that science is hard (Yalım, 2003). The mentioned problem is actually related to the previous problem. Students will continue to struggle at science class as long as they do not know where the information of the class comes from. Yet, children who comprehend that science class is completely related to life will take a big step towards being a science literate. And science classes that are fun and not away from games will increase primary school students' attention towards the class, and therefore the success will improve. Studies of many years emphasize especially the importance of primary school level games at the classes.

Games are important occupations for children. Children do not just have fun while playing. Games can create opportunities where they can learn, observe and be in a social environment. In

this aspect, game is not a pastime but a necessary preparation for next stages of life. Children learn by playing. They develop bodily, mentally and intellectually by playing. They climb the stairs of growing up by playing (Altınköprü, 2000).

Playing children have their own imaginary world. However, the elements of the game they play are real. They process, combine and complete what they perceived from the outer environment with their own ways. In other words, a game is the creation environment for children (Yörükoğlu, 1983). Game affects children's cognitive development positively and gives opportunity for them to explore their surroundings (Yavuzer, 1993).

If creative drama applications are examined, it is seen that creative drama method is used as a teaching tool and this affects educational environments positively. In this research, it was addressed how creative drama method affects educational environments and students.

Few number of researches concerning creative drama shows that more researches need to be carried out in this area. And in the addressed researches, it was observed that a limited number of experimental studies had been carried out. There is more need for experimental studies than literature scanning. The results of the experimental studies to come will help a newly developing area prove itself because they will bring the effect of creative drama to the fore more clearly (Akoğuz, 2002).

Creative drama being relatively a new area and the inability of the studies in this area increase the importance of this research. A few studies in a certain area cannot unfortunately suffice for passing a judgment on that area. Many studies

on related area help us have right ideas about that area. Studies like this will set a lot of examples in creative drama area and contribute to this method's development.

This experimental study aims to determine whether the applied method supports critical thinking skill that is one of the main purposes of science teaching program in our country. Main purpose of the study is to contribute to creation of more effective, productive and functional science classes in our country.

Will creative drama, a method which is expected to help students learn by doing and experiencing affect students' success? Will students' critical thinking skills change positively at the end of the classes using this method? These two questions constitute the source of our problem.

PURPOSE

The purpose of this research is to try to observe how creative drama methods that are applied in the force and motion unit of science and technology class change students' critical thinking skills and successes.

METHOD

The research was carried out in pretest-posttest pattern with control group. The dependent variables of the research are achievement status on force and motion topic of science and technology class and critical thinking skill. The independent variable of the research is the used teaching method. There are two levels of the teaching method: experiment and control. In the experiment group, creative drama method that students encountered for the first time was used in addition to the nor-

mal class routine. In the experiment group, the teacher used eight pre-planned creative drama workshops throughout the six-week unit. In the experiment group, creative drama method was used as well as these methods. In the control group, only the teaching plans parallel to MEB Science and Technology Program were prepared. In the control group, the studies carried out were direct expression, question-answer, experiment and group studies and poster studies.

a- Sample: The sample of the study consists of total 47 seventh grade students, 27 of which are female and 20 of which are male, in a private primary school in Sakarya in 2009-2010 educational year. 24 of these students are in experiment group, 23 of them in control group.

b- Data Collecting Instruments: The data collecting instruments used in the research are "Force and Motion Achievement Test" which was developed by the researcher and "Cornell Critical Thinking Skill Test".

b.1- Force and Motion Achievement Test: Force and motion achievement test was developed by the researcher. Before the achievement test was prepared, attainments of force and motion topic in 7th grade science and technology class had been determined at first. After the attainments had been determined, 72-item force and motion achievement test was formed. 4 science and technology teacher and 2 associates of science teaching department examined the validity of achievement test information and its compatibility with the attainments. 2 Turkish-language teachers examined its compatibility with grammar. After expert view was received, pre-application of the test form was applied to 257 students of six dif-

ferent primary schools on the first term of 2009-2010 educational year. After the pre-application, 35 items that were less distinctive and reliable were excluded from the test with the suggestion of the expert. The alpha reliability coefficient of the 37-item force and motion achievement test was found as 0.93 by using ITEMANN software.

b.2- Cornell Critical Thinking Skill Test Level X (CEDTDX): In this research, CEDTDX measuring tool that was developed by Ennis and Millmann (1985) was used in order to determine the critical thinking skill levels of students. CEDTDX is a measuring tool of which validity and reliability studies, pilot applications and adaptations to Turkish language were carried out beforehand. This test was directly taken and applied from doctorate thesis titled “Critical Thinking Skills of Primary School Students” that was prepared by Cüneyt Akar at Ankara Gazi University, Institute of Educational Sciences, Department of Primary School, School Teaching in 2007. Cornell Critical Thinking Skill tests are composed of two measuring tools: Level X and Level Z. Level X is a measuring tool appropriate for 4th-14th grades. Level Z is appropriate for skilled secondary level students and undergraduate and higher student groups. In this research, Level X was used since the qualifications of the working group were appropriate. Students try to find right answers to some questions in the test that was prepared as a space adventure. Test is composed of 4 dimensions (Sağlamöz, 1990). First dimension, *Deducing by inductive reasoning*: This dimension of the test has 23 questions, and students are expected to be able to reach right deductions based on the information (tips) they are given. Second dimension, *Deducing by deductive reasoning*: This dimension

has 14 questions. Students are expected to get the right result based on a generalization. Third dimension, *Judging the reliability of observations and resources*: This dimension has 24 questions. Students are expected to make right observations and decide which of the provided data are reliable. Fourth dimension, *Defining (determining) the assumptions in the expressions*: This dimension has 10 questions. In this dimension, students are expected to determine stereotype judgments and pre-acceptances in the expression. The test is a measuring tool that is composed of 71 items which are multiple choice with three choices. CEDTDX is applicable to 4th to 14th grades. The application time of the test is about 50 minutes for secondary and higher levels. A 64-minute application time is proposed for primary level (Önder, 2004).

b.2.1- Reliability of Cornell Critical Thinking Skill Test Level X: The reliability (KR 20, KR 21 and Sperman-Brown) values of the tool seem to be between 0.67 and 0.90 based on the data obtained from various researches. The correlation of each dimension's points with all total test scores of the measuring tool was performed on 8th and 9th grade level. Scale's dimension-all test correlation values were found as 0.71 for the inductive dimension, 0.69 for the dimension of judging the reliability of the claims, 0.84 for deductive dimension and 0.55 for the dimension of realizing the assumptions. Item discrimination was found as 0.36 and 0.64 in 6 studies carried out on 4th-8th grade level (Ennis, Millmann and Thomko, 2005).

b.2.2- Validity of Cornell Critical Thinking Skill Test Level X: In the validity studies of the measuring tool, criterion (similar scales) validity

was taken into consideration. CEDTDX's correlations with some tests measuring critical thinking skills were taken into consideration. Its correlation with Watson-Glasser Critical Thinking Test was found as 0.41-0.49, with Logical Reasoning Test as 0.50. Correlation values varying between 0.31 and 0.60 were obtained with 6 measuring tools that measure similar qualifications. Correlation varying between 0.27 and 0.69 was found between CEDTDX and different measuring tools that measure IQ and aptitude. These results indicate the validity of the scale (Ennis, Millmann and Thomko, 2005).

c- Application stage: The study was initiated by researcher's training stage. This study was decided after the researcher had received three stages of creative drama leadership training. Studies about the topic and exemplary plans of creative drama workshop had been examined before the start of the study. After the topic and grade level of the study had been decided, plans of creative drama workshop appropriate for MEB curriculum were prepared, examined by creative drama leaders and changes were made. Class materials were prepared based on these plans. Creative drama aided teaching plans were applied on 24 students of the experiment group for six week. Materials prepared at the workshop studies and workshop images were archived.

d- Analysis of the data: The data obtained from the achievement test and critical thinking skill test were analyzed during the study and results were added to the findings section. One-factor variance analysis (ANOVA) and irrelevant sample t-test were applied for the irrelevant samples in the data analysis, and the results were interpreted.

FINDINGS

1. Analyzing the achievement pretest score average of the students in the experiment group in which force and motion unit was taught with the support of creative drama methods and the achievement pretest score averages of the students in the control group.

Table 1. Irrelevant Sample t-Test Results of the Achievement Pretest Scores of the Experiment and Control Groups

	N	$\bar{X}$	Ss	Sd	t	p
Control Group	23	12.43	.66	45	.070	.94
Experiment Group	24	12.37	.53			

In Table 1, based on the pretest achievement score averages of the students in the experiment and control groups, there is no significant difference between the achievement scores [$t(45)=.070$, $p>.94$]. Therefore, it can be said that the pretest achievement scores of the experiment and control groups were equal at the beginning. In other words, it can be said that the experiment and control groups were peers before starting to the experimental processes.

2. Analyzing the achievement post test score average of the students in the experiment group in which force and motion unit was taught with the support of creative drama methods and the achievement post test score averages of the students in the control group.

Table 2. Irrelevant Sample t-Test Results of the Achievement Post Test Scores of the Experiment and Control Groups

	N	$\bar{X}$	Ss	Sd	t	p
Control Group	23	28.30	.94	45	1.19	.23
Experiment Group	24	29.66	.64			

Based on the post test achievement score averages of the students in the experiment and control groups, there is no significant difference between the achievement scores in favor of the experiment group [$t(45)=1.199$, $p>.237$]. This finding cannot be interpreted as that students' achievement in the experiment group in which creative drama method was used as a support is significantly higher than the students' achievement in the control group. Based on the arithmetic means, it is seen that there is no big difference between the groups. So, it can be concluded that creative drama method has no positive or negative contribution to the test skills of the students.

3. Analyzing the critical thinking skill pretest score average of the students in the experiment group in which force and motion unit was taught with the support of creative drama methods and the critical thinking skill pretest score averages of the students in the control group.

Table 3. Irrelevant Sample t-Test Results of the Critical Thinking Skill Pretest Scores of the Experiment and Control Groups

	N	$\bar{X}$	Ss	Sd	t	p
Control Group	23	47.78	2.54	45	.62	.53
Experiment Group	24	49.37	2.53			

Based on the critical thinking skill pretest achievement score averages of the students in the experiment and control groups, there is no significant difference between the achievement scores in favor of the experiment group [$t(45)=0.626$, $p>.535$]. It is seen that critical thinking skills of the students in the experiment group are slightly higher than the control group at the beginning. This difference may be of various reasons. The students in the experiment group were told that creative drama method would be used for the related unit, therefore focusing the students' attention on the test. Based on the arithmetic means, it is seen that there is no big difference between the groups.

4. Analyzing the critical thinking skill post test score average of the students in the experiment group in which force and motion unit was taught with the support of creative drama methods and the critical thinking skill post test score averages of the students in the control group.

Table 4. Irrelevant Sample t-Test Results of the Critical Thinking Skill Post Test Scores of the Experiment and Control Groups

	N	$\bar{X}$	Ss	Sd	t	p
Control Group	23	49.26	2.35	45	2.40	.02
Experiment Group	24	54.91	2.35			

Based on the critical thinking skill post test achievement score averages of the students in the experiment and control groups, there is a significant difference between the achievement scores in favor of the experiment group [$t(45)=2.404$, $p>.05$]. There is a result supporting our hypothesis based on the fourth sub problem according to the table. We can say that creative drama method affects students' critical thinking skills positively.

CONCLUSION AND DISCUSSION

The following results were concluded based on the findings that were obtained from this experimental research which is aimed at the effectiveness of the creative drama supported classes on the students' achievement and critical thinking skill. Creative drama method does not affect students' test skills and achievements positively or negatively. At the end of the study, there was a slight difference in the arithmetic means of the students in the experiment group at the achievement post test. This difference is not enough in the aspect of study's significance. As a result, creative drama method does not affect students' achievement at multiple choice tests.

Creative drama method affects students' critical thinking skills positively. At the end of the study,

it can be clearly seen that critical thinking skill post test arithmetic mean of the experiment group is higher than critical thinking skill post test arithmetic mean of the control group. Provided this difference can be observed at the post test but not at the pretest, we can say that creative drama method changes students' critical thinking skills positively.

In his master's thesis titled "The Use of Drama Technique in Teaching Foreign Language to Children", Çevik (2006) argues that drama is appropriate for students of all levels, starting from the ones who have just started learning a foreign language. It was stated that students can express themselves more freely in the group activities when drama technique is used, and a foreign language can be taught without native language by drama and puppet activities. Bertiz studied with science preservice teachers for 14 weeks and concluded that teacher candidates embraced the method meanwhile and there were positive changes in their attitudes (Bertiz, 2005). Another study that supports this one is Okvuran's study that was carried out in 2000. Okvuran studied with 240 adults who received drama lessons, and stated that at the end of the training, the participants had high level of positive feelings and thoughts about creative drama supported classes (Okvuran, 2000).

In the study in 2006, Kaya studied with third grade students and observed that students were more enthusiastic and produced more creative products at creative drama supported visual arts classes (Kaya, 2006).

The results of Yalın's master's thesis, another study in the area of science, do not support our

study's results. Yalım (2003) studied with fourth grade students in the research and argued that creative drama method had a positive contribution to students' academic achievements. Yalım measured student's academic achievement with multiple choice test as in this study. However, there was no significant difference at the academic achievements measured with multiple choice test of the experiment and control groups in this research. Creative drama method did not positively change students' academic achievements that we measured with multiple choice test. It is thought that more solid results can be obtained if academic achievement is measured by using different measuring methods, not by using only one assessment tool in order to be sure whether creative drama affects academic achievement positively or negatively.

Karateke who studied with second grade students as in this study measured creative drama's effect on students' written expression skills and concluded that creative drama method contributed to students' written expression skills positively (Karateke, 2006).

In a study of a different area, Önalın found that creative drama is effective on the hearing impaired people aged 10-12 learning social skills and interpreted this as an important factor in the social skill development of hearing impaired children generally (Önalın, 2002).

Erdoğan observed creative drama's effect on 8th grade students' depressive symptoms and self-concept level and concluded that there was a huge decrease in depressive symptoms of 18 students on whom creative drama methods was applied (Erdoğan, 2006).

SUGGESTIONS

a- Suggestions on preparation stage

It is definitely suggested for a researcher who wants to carry out creative drama workshops to join a creative drama leadership program before the research. If the researcher did not carry out creative drama workshops before, they should join creative drama workshops carried out by a professional and make observations. Before the preparation of creative drama plans, attainments should be determined, group qualifications should be identified and techniques fit for the group should be determined.

Another important issue is the duration of the workshops. If the durations are not well-determined, the leader may struggle in workshop applications. So before determining the duration, pilot applications of the plans should be done if possible. While determining the duration, group's qualifications should be taken into consideration.

Before the workshop activities, the music for the workshop should be gathered together. It should be checked that music is appropriate for the attainments. The place where the workshop activities will be held is one of the issues to be careful with. The place should be chosen appropriately for the activities. It should be neither too spacious nor too narrow.

b- Suggestions on the application stage:

It is suggested that the leader should not intervene with students much throughout the workshops. If the leader feels the urge to intervene to direct the workshop, they can join the activity by playing

a role. This method is impressive especially for primary school students.

When a student does not want to join the activities, it is a used and useful method to put that student at ease. The student wants to go back to their friends after relaxing and calming for a while. Especially primary school students will not want to stay alone for a long time and want to go back to the activities. When this method is proven useless, different methods may be developed according to the specific situation of the student.

While studying with primary school students, it is important that instructions are very clear and comprehensible. Otherwise, the students may not understand what they will do, get bored, and this will effect group's dynamics badly. The leader should not start the activity before making sure that every student understands the instruction. It is suggested that triple block classes are used in the activities.

c- Suggestions on the study:

In the study, academic achievement was measured with the multiple choice test developed by the researcher. Based on the aims of creative drama method, multiple choice test is not a very appropriate measuring-assessing technique for this method. When a similar study is to be prepared, it is suggested that at least one of the alternative measuring-assessing techniques are used as well as this kind of measuring test and the results are .assessed accordingly

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7.SINIF FEN VE TEKNOLOJİ DERSİNİN YARATICI DRAMA DESTEKLİ İŞLENMESİNİN ELEŞTİREL DÜŞÜNME BECERİSİ VE BAŞARI ÜZERİNE ETKİSİ

Özet: Bu çalışmada, yaratıcı drama çalışmaları fen eğitimine uyarlanmış, uygulamalar yapılmış ve bu yöntemin öğrencilerin eleştirel düşüncelerini ve başarısını nasıl etkilediği kontrol edilmiştir. Çalışmada yaratıcı drama yöntemi üzerine çalışılmıştır çünkü yaratıcı drama yönteminin amaçları incelendiğinde çağın gerektirdiği yetileri öğrencilere kazandırmak amacıyla yapılandırıldığı, günümüze uygun bir öğretim yöntemi olduğu gözlemlenmektedir. Yaratıcı drama yöntemi bilgiye kendi ulaşabilen ve bilgiyi günlük hayatta kullanabilen, kendini ifade edebilen, grup çalışmalarında başarılı, çok yönlü düşünebilen, girişimci, kişilere saygılı, sosyal ortamın farkında olan, elindeki imkânları verimli kullanabilen, yaratıcı bireyler oluşturmayı amaçlamaktadır. Fen ve teknoloji dersinin öğrencilerde kazandırmak istediği nitelikler ile yaratıcı drama yönteminin amaçları karşılaştırıldığında büyük bir uyum gözlemlenmektedir. Bu durum yaratıcı drama yönteminin diğer birçok alanda olduğu gibi Fen ve Teknoloji alanında kullanılmasının uygun olduğunu göstermektedir. Bu araştırma ön test-son test kontrol gruplu deneysel desende yürütülmüştür. Araştırmanın bağımlı değişkenleri fen ve teknoloji dersi kuvvet ve hareket konusuyla ilgili başarı durumu ve eleştirel düşünme becerisidir. Araştırmanın bağımsız değişkeni ise kullanılan öğretim yöntemidir. Öğretim yönteminin deney ve kontrol olmak üzere iki düzeyi vardır. Deney grubunda öğretmenin işlediği derse ek olarak öğrencilerin ilk defa karşılaştıkları yaratıcı drama yöntemi uygulanmıştır. Deney grubunda öğretmen altı haftalık ünite boyunca önceden planlanmış olan 8 yaratıcı drama atölye çalışmaları uygulamıştır. Deney grubunda bu yöntemlerin yanı sıra yaratıcı drama yöntemi kullanılmıştır. Kontrol grubunda ise sadece MEB Fen ve Teknoloji Programına paralel ders planları hazırlanmıştır. Kontrol grubunda düz anlatım, soru cevap, deney, grup çalışmaları, poster çalışmaları yapılmıştır. Araştırmanın örneklemini 2009–2010 eğitim-öğretim yılı Sakarya ilindeki özel bir ilköğretim okulunda okuyan 27 kız, 20 erkek olmak üzere toplam 47 yedinci sınıf öğrencisi oluşturmaktadır. Araştırmaya katılan 47 öğrencinin 24’ü deney, 23’ü kontrol grubunu oluşturmaktadır. Altı hafta süren deneysel işlemler sırasında deney grubunda fen ve teknoloji dersinin işlenmesinde MEB Fen ve Teknoloji Programı doğrultusunda hazırlanan ders planlarının yanı sıra sekiz yaratıcı drama atölyesi uygulanmıştır. Kontrol grubunda ise sadece kitap doğrultusunda hazırlanan planlar uygulanmıştır. Verilerin toplanmasında tarafımızdan geçerlik ve güvenilirlik çalışmaları yapılmış başarı testi ve Cornell Eleştirel Düşünme Testi kullanılmıştır. Verilerin analizinde ilişkisiz örneklem t testi uygulanmıştır. Araştırma sonuçları, fen öğretiminde Yaratıcı drama çalışmalarının fen öğretiminin temel amaçlarından biri olan eleştirel düşünme becerisini olumlu ve anlamlı olarak etkilediğini göstermiştir. Ayrıca elde edilen bulgular, dersle birlikte kullanılan yaratıcı drama atölyelerinin öğrenci başarısını anlamlı bir şekilde arttırmadığını göstermiştir.

Anahtar Kelimeler: Yaratıcı Drama Çalışmaları, Dramatizasyon, Eleştirel Düşünme Becerisi, Yaratıcılık, Rol Oynama