Estudio experimental e primer curso para preve operaciones básicas con

operaciones básicas con

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Resumen

Introducción Cuendo se enseña a sumar a los niños generalizada, el usar dus dedos como herramienta p utilizando los dedos para contar mientras que otros alumnado con el hábito de contar con los dedos tien suficientes para realizar cálculos matemáticos. El pr prevenir que los estudiantes utilicen los dedos para que ya tienen este hábito puedan abandonarlo.

Método Dado que el interés del investigador fue con en las puntuaciones pre y post test, del grupo experi recibido diferente formación, se utilizó un diseño pr grupo había 33 estudiantes mayoritariamente de 7 a académicos, el grupo experimental recibió procedim grupo control recibió la instrucción tradicional para

Resultados Los resultados muestran que los estudia éxito sin usar los dedos en cálculos básicos debido a

Discusión y conclusiones Creemos que se pueden co con la mejora de las habilidades de conteo de los es remediativo se extienden y se proporciona un ambi programa.

Palabras Clave: conteo rítmico, conteo rutinario, o

conteo abstracto, habilidades de conteo.

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Estudio experimental entre alumnado de primer curso para pre
con los dedos

An experimental study on preve
finger counting in basi

Abstract

Introduction: When counting is taught to students a
generally allowed to use their fingers as a counting t
using their fingers to count, while others stop this ha
of using their fingers to count have difficulty when t
mathematical calculations. The purpose of this expe
from finger counting and enable students who alrea
this habit.

Method: Since the interest and the intent of the res
between students' pre and post test scores from the

different instructional process, this study is static-gr
there were 33 students who were mostly seven years
received the remedial procedures while the control

instruction for two whole semesters in an academic

Results: The study revealed that the students in the
without using their fingers in basic calculations due
this group.

Discussion and Conclusion: It is believed that better
counting skills can be achieved if the content of the
appropriate environment for the application of the

Keywords: Rhythmic counting, rote counting, sem
abstract counting, rote counting, counting skills

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Introduction

Mathematicswhich has unique contributio

development of students is included in formal curri
(Lupiañez, 2009). As was also stated in literature, nu
and key concepts that are taught to students in imp

education (Baroody 1987; Bashash, Shiraz, Outhred

Counting is the foundation of many skills wh
education. Therefore, counting exercises such as cla
constitute a basis for students' learning arithmetica
(Hohmann & Weikart 2000). In addition to this, the
an important role in helping students to comprehen
many, big-small, order of numbers and so on) and t
(Maclellan 1997).

Counting based approach is always used w
calculations (Sarama & Clements 2003). According t
thinking strategies significantly contribute to studen
Hunting (1998), who emphasize the importance of
process, state that in order to participate in problem
acquire counting skills and learn counting accurate
tools. Besides, there is an important relationship be
numbers (Bashash, Outhred & Bochner 2003).

The development of the counting concept an
Latest research indicates that children start using nu
seven (Baroody 1987; Diezmann and English 2001; F
Therefore, students have different skills related to co
education. Regarding this, there are various views ab
According to Hunting (1999), children learn countin
the people around them. It is beneficial to eliminate
related to counting.

A number of research has been carried out ab
numbers and how students acquire counting skills i
Nodding 1990; Goldin, DeBellis, DeWindt-King, Pas
Herscovics 1991; Hannula & Lehtinen 2005; Han
Herscovics, 1996; Goldin 1990; Peper&Hunting 1998
studies, counting is first taught by matching objects
the names and order of numbers in time. Studies ca
are in accordance with the principles recommended
Steffe and Cobb (1988). The study done by Thomas,
example. Some studies also focused on using counti
period (Baroody 1987, 1999; Bashash, Quthred, & B
1999a; Fuson 1988; Maclellan 1997; Sophian 199
Glasersfeld, Richards, & Cobb 1983; Thompson 199
followings are common in the studies on counting s

Starting to count by matching one by one a
counting together

The representation and usage of concrete,
are used in counting

The usage of hands in starting from a numb
or in doing basic calculations (Burton,1985
Gray, 1991; Johansson, 2005; MacLellan,19

Students use their fingers while counting and c

of finger counting or being afraid of making mistake
even need to touch the objects or match them with t
counting them (Brias & Siegerler 1984; Wilkonson 19
with counting or prevent them from miscounting, it
as beans, marbles, buttons, beads, matchsticks, and
Hopkins, Gifford, & Pepperell 1996; Nair & Pool 199
miscounting when they solve problems based on co
is considered as a useful approach in order to stop s
making mistakes. However, finger counting should
If finger counting has become a habit, students have

in counting. Besides, using fingers is not an effective
numbers (Burton 1985; Johansson 2005).

Although using fingers is the first method used
counting has negative effects on students. Therefore
in meaningful counting exercises (Clements, 1999b;
Hunting (1998) have also emphasized the importan
solving. According to them, meaningful counting is
in problem solving processes, acquiring counting sk
any matching tools. Moreover, Cobb (1987) goes on

strategies contribute significantly to students' probl

Counting is a cognitive activity requiring eye

Counting is a cognitive activity requiring eye
(Wilkonson 1984). In learning how to count, knowin
an important stage. One of the purposes of counting
number to the cardinal value (Orton & Frobisher 19
need to continue counting on concrete objects. Whi
matching tool is not necessary at all. In order to und
researcher considered the challenging questions of
tool, can it be stopped before becoming a habit? Wh
of fingers? How can meaningful counting be perfor
used as a matching tool? “

Considering these challenges, following resea

- Is there a significant difference between th
  experimental group implemented “counti
  group implemented traditional method, “

Method

This research was carried out by taking accou
test post-test experimental study design (Büyüköztü
Demirel, 2008). The researcher studied in public pri
chance to assign or pair the students, two first grade
primary school in the city of A rı, located in the east
institutions providing preschool education in the cit
contribute to their children's preschool education q
primary schools in this city showed that children ha
basic calculation skills. The rationale for choosing su
would get little help from their environment outside
program applied in the study would be observed eas

Participants

There were 33 students (19 male, 14 female),
and the study continued for two semesters in an aca
classes were male and both had six years of teaching
with the same teachers.

Instruments and procedure

First, each student's level of counting forward
the two first grade classes. In the test, whether stude
numbers were determined. Then, students were ask
such as students, beans, and buttons. In this way, st
numbers was measured.

Although the studies of Fuson (1988) and Wy

this study have similarities, they are different in tern
counting forward, ii) the order and types of counting
counting exercises, v) the readiness and ages of the

Before the lessons, the teacher of the experim
the method that he would use and the researcher wa
order to carry out the study successfully. So, this clo
provided objectivity in the evaluation stage.

The mathematics syllabus followed in both g
experimental group additional remedial application
the exercises, the teacher tried to prevent exam anxi
beforehand. The assessment tools used in evaluatin
and during the evaluation, only how high students c
observed and recorded on an observation summary
last two months of each academic year.

Counting apparatus:

The activities used in the remedial program t

school mathematics curriculum in the experimental

The counting tools were composed of conc

abacus, beads, marbles, beans, students
representations of objects which can be fou
Teachers draw the shapes below and assoc
After doing the activities in stated in the Fig
was done. The numbers above the line wer
line were read silently.
Figure 3 shows counting of disarranged obj
and grouping.

Figure 1. Counting panel 1

Figure 3. Counting panel 3

Problems related to daily life were asked to
problem. For example: “Ali’s family consur
many loaves of bread do they eat in a week
Games, competitions, riddles, songs, tongu
performed in the classroom or in the schoo
used in teaching and evaluating rote count
Using concrete and semi-concrete countin
such activities, students were asked to cou
fixation.

Students were asked to guess the number o
objects in the environment (Figure 3), to co
they get to the correct answers. The activiti
like matchsticks and beans on a table, and

improve the students' intuition and guessi
thinking skills. Logical guessing is one of th

The procedures applied in control and experimental

The control group received traditional way of
in basic calculations as was required in the first grad
employs several matching exercises containing mai

Teachers of the experimental group were info
the essence of the remedial program prepared by th

1. Students should not be asked to count in t
should be allocated to counting. For exam
minutes or less in a lesson. The exercises s
in most lessons throughout the semester.
2. All counting activities should be done in th
given as homework.
3. Rote counting should be limited to countin
4. In the counting activities, first the teacher
should repeat what the teacher has said. U
teacher should do such activities often (Bu
Gifford & Pepperell 1996; Nair & Pool 1991

5. Students should be asked to perform rote c
6. (Rote or concrete) individual counting sho

controlling.

7. Students should be first asked to count for
perceive the name and order of numbers a
8. While having students count, activities inc
should frequently be used.
9. Rote counting should be made meaningfu
environmentand counting tools by estal
between objects and numerals (Busbridge
Pepperell 1996; Nair & Pool 1991; Orton &

10. Students should be asked to count the
or by grouping. Counting boards should be
and students should be asked to repeat the
11. The following order should be followed
ones: for example, the teacher who will tea
lesson by asking these questions: “Does ev
eyes are there in the classroom?” While ans
should count by ones. However, while cou
numbers by saying them loudly. He can als
numbers. Students should do the same wh

“counting the even numbers loudly”. Anot
problem and the hands, legs or ears of the

While the teacher and the students are cou
silently and even numbers loudly. This me
silently". In this activity, pointing strategy
can be used.

12. The same or similar activities should b
such activities are done, students start to c
they will start counting in their minds inste
silently. Counting in their minds makes m
also easier.

Types of counting and the analysis of data

In this research, following counting types wit
subsequent steps

1. Teaching rote counting by ones and tens. Th
names and orders of the numbers, and the rhythm b
mathematics educators (Baroody 1999; Carr 1995; G
can succeed in rote counting before learning the bas

2. Changing rote counting by ones into meani
students the relation between counting and the con

values of numbers because there is a relationship be

values of numbers because there is a relationship b
and the counting style and Brannon and Vande Wal
rote learning provides a good foundation for meani
steps was to improve students' counting skills.

3. Enabling students to count concrete or semi
fingers. In this step, students were taught pointing st
by touching fingers. These activities were not done i
easier than eye fixation. Before being able to count u
achieve a certain level of counting speed by pointing
activities made it easy to teach counting by groupin
study and the studies done by Ginsburg, Klein and S
applied.

All process in both groups were observed, rec
evaluation of the observation process, firstly studen
100 was observed. Secondly, the students were give
buttons, match sticks etc.) or semi-concrete objects
them. While the students were counting, their beha
carefully and recorded into the sheets. The evaluati
forward on concrete and semi-concrete objects and
analysis, three points were given to the students wh
fingers, 2 points were given to the students who rece
their fingers, 1 point was given to the students who
their fingers while counting. All process were observ
with the researcher and the teachers in both classes

The data obtained in this dtudy was analyzed

Square) 2 was used as the statistical analysis. (p<,05

Results

Before starting the research, differences betw
determined through a pre-test. In addition, in the pr

accepted as the ability to memorize counting forwa
forward by ones accurately on objects up to 15. Obs
teachers showed that the students in both experime
counting from 1 to 100 by ones accurately.

The differences between the pre-test scores o
were not statistically significant (2=3,137, p=.069). Ho
and Graph 1, there was statistically significant differ
students in experimental and control groups.

Table 1. *The values regarding the re*

	Experimental Group Pre-test 1-A			**Control Group Pre-test 1B**			**Experi Group 1**	
	P	G	K	P	G	K	P	
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%
Grades	69,7	18,1	12,2	72,7	15,1	12,2	12,1	3

P: Counting by touching (one-to-one),
G: Counting by pointing or eye-fixation

J: Counting by pointing or eye fixation,
K: Other counting styles (novel, stable order)

The frequency of the undesired “counting wit
students in the experimental group radically decrea
remedial program, as compared to the students rece
The results also showed that there is statistical signi
post-test scores concerning acquired counting abili
Control groups, in favor of experimental one.

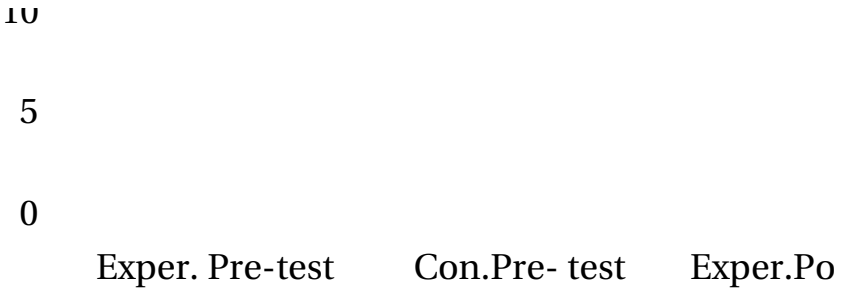

Figure 1. Evaluation in the

While in the experimental group (P) type cou
42,4. It is significant that the difference between the
the students who can use (K) type counting is 57.6 i
who can use (K) type counting in the control group i
(2= 9,127, *p*=.010) is related to (P) type and (K) type
type counting is the same for each group.

Discussion and conclusion

At the end of the first class, the students in bo
sequence of numbers up to 100 and count forward b
the results of the previous research done on this sub
1993). Therefore, it can be said that sinc
count to 100 accurately without using their fi
applied in the study was successful.

Since children start counting before going to
Fuson 1988; Hunting 1999; Irwin 1996), many childr
their fingers for counting. This study aimed to enabl
finger counting acquired before starting school. In c

that counting activities should be “short, frequent, a
done for short periods of time in most lessons throu
counting is associated with daily life, students beco
and competitions including counting also increase s
found in a study that students’ numeric competenci
problems.

In the first grade, significant differences were
experimental groups in terms of counting concrete a
students’ using (P) type counting in the control grou
using (K) type counting was 57,6. The difference bet
style was significant. Moreover, this difference obse
from the application of remedial program in the exp
results, it can be said that finger counting is a habit t
program and the age of the participants, the researc
mentioned in the previous studies (Fuson 1988; Gel

Applying the remedial program enabled the s
(K) type counting instead of (P) and (G) type countin
between individuals or groups in the two groups or l
used (K) type counting finished counting more quic
counting. The students who observed that the stude

advantageous tried to use that kind of counting.

According to the findings obtained in this stu
using fingers as a tool to match while counting was
breakable habit indicates that other wrong habits re
informally can also be broken. The researcher believ
influence of meaningful counting on problem solvi
Hunting 1998; Sarama & Clements 2004; Thomas, M
significantly affected by the results of this study. Mo
study will positively influence students' ability to do
correctly in a short time, which were recommended
(1994). Actually, the findings of this experimental st

researcher. However, this study constitutes the first
removing the failure of calculation skills of pupils re
activities. For example, if the students calculate 13+
when they use them, and they may be unsuccessful
experimental study clarified that when the students
arithmetical calculations, their abstract thinking an
developed easily. Their failure in these basic calcula
approach and the calculations will be done in shorte

This study can also be applied to any classroo

implemented in the study may provide a basis for fu
be added to the primary school mathematics curricu

counting can be introduced in mathematics syllabu
schools. In the specific units, counting can be assoc
daily life. It is believed that better results in terms o
be achieved if the content of the remedial program i
for the application of the program is provided.

References

Ausubel, D. P. (1968). *Educational psychology: a cogn*
and Winston.

Baroody, A. J. (1987). *Children's mathematical thin*
preschool, primary and special education teac
Colombia University.

Baroody, A. J. (1999). Development of basic countin
among children classified as mentally han
International Review of Research on Mental R
Academic.

Bashash, L., Outhred, L. and Bochner, S. (2003). Cou
students with moderate intellectual disabiliti
Development and Education. (50), 325-345

Brannon, E.M., & Van de Walle, G. A. (2001). The dev
competence in young children. *Cognitive Psycho*

Briars, D., & Siegelr, R. S. (1984). A featural analysis o

Briars, D., & Siegler, R. S.(1984). A featural analysis o
Developmental Psychology, 20(4), 607-618.

Bruce, B. (2003) One, two, three and counting Young
the cardinal and ordinal aspect of number. *Educa*
26.

Burton, G. M. (1985). *Good beginning teaching early*
CA : Addison Wesley

Busbridge, J., & Womack, D. (1991). *Effective maths*
mathematical concepts. England: Stanley Thorn

Büyüköztürk, ., Çakmak, E. K., Akgün, Ö. E., Karade
ara tırma yöntemleri (Scientific research meth

Carr, J. (1995). *Down's syndrome: children growing u*
Press.

Clements, D. H. (1999a). Geometric and spatial thin
(Ed.), *Mathematics in the early years* (66–79)
Teachers of Mathematics.

Clements, D. H. (1999b). Subitising: What is it? Why
Mathematics, 5(7), 400-404.

Cobb, P. (1987). An analysis of three models of early
Research in Mathematics Education, 18(3), 163-

Davis, R. B., Maher. A., & Nodding, N. (1990). *Cons*
learning of mathematics (Monograph Number 4
Education). Reston, VA: National Council of T

Diezmann, C. M., & English, L. D. (2001). Developin
sense.*Roeper Review. 24*(l), 11-13.

Esther, A. M., Schopman, J., & VanLuit, E. H. (1999).
kindergartnes with special educational needs
of Special Needs Education. 14(1), 61-69.

Fuson, K. C. (1988). *Children's counting and concep*
Verlag.

Gelman, R., & Gallistel, C. R. (1978).*The child's unde*
Harvard University Press.
Gelman, R. (1993). A rational - constructivisit accou
objects.*The Psychology of Learning. 3*,0 61-96.

Ginsburg, H. P., Klein, A.& Starkey, P. (1998). The de
thinking: Connecting research with practice.
Renninger (Eds.), *Handbook of child psycholo
practice(401–476). New York: Wiley.
Goldin, G. A. (1998). Observing mathematicalpr
interviews. In: A. Teppo (Ed.), *Qualitative
education* (40–62) (Monograph No. 9, Jour
Education).
Goldin, G. A., & Herscovics, N. (1991). The conceptu
children's early arithmetic. In: R. G. Underhil
*Annual Meeting of the North American chapte
psychology of mathematics educatio*n (118–125).
Goldin, G. A., DeBellis, V. A., DeWindt-King, A. M., P
Task-based interviews for a longitudinal s
development. In: I. Hirabayashi, N. Nihda, K.
*Proceedings of the seventeenth annual confere

*psychology of mathematics educatio*n Vol. 1, (19
Gray, E. (1991). An analysis of diverging approaches

consequences*Educational Studies in Mathem*

Hannula, M. M., & Lehtinen, E. (2005). Spontan
mathematical skills in young children.*Learning a*

Hannula M. M.,Räsänen P., & Lehtinen E.(2007). De
spontaneous focusing on numerosity and sub
*Thinkingand Learning*9(1), 51–57.

Herscovics, N. (1996). The construction of conceptu
Steffe, P. Nesher, P. Cobb, G. A. Goldin, & B. G
learning(351–379). Hillsdale, NJ: Lawrence Er

Hohmann, M., & Weikart, D. P. (2000). *Küçük Çoc*
Children, translated into Turkish by S.Saltiel I
Education Foundation.

Hopkins, C., Gifford,S., & Pepperell,S.(1996).*Mather*
*progression.*London: David Fulton Press.

Hughes, M. (1989).*Children and number difficulties*
Blackwell.

Hunting, R. P. (1999). Rational number learning in t
Copley (Ed.), *Mathematics in the early years*80
for Teachers of Mathematics.(ERIC Documen

Irwin, K. C. (1996). Young children's formation of nu

Mansfield, N. A. Pateman & N. Bednarz (Eds.)
children: internationalperspectives on curri

Netherlands: Kluwer Academic Publishers.

Johansson, B. S. (2005). Number-wordsequence *Scandinavian Journal of Psychology*, *46*, 157–167

Lupianez, J., L. (2009). Research in mathematics edu *Journal of Research in Educational Psychology*,

MacLellan, E. (1997). The importance of counting. In *learning early number*. Buckıngham: Open Uni

Mar Garcia, M. del (2009). The influence of new tech mathematics in secondary students. *Electronic J Psychology*, *17*(7), 369-396.

Nair, A. & Pool, P. (1991). *Mathematics methods. teachers.* Malaysia: MacMillan Education Ltd.

NCTM (2000). *Principles and standards for school* Publishing.

Orton. A. & Frobisher, L. (1996). *Insights into teaching*

Pepper, K. L. & Hunting, R. P. ,(1998). Preschoolers' *Research in Mathematics Education*, *29*(2), 164-

Reynolds, A. & Wheatley, G. H. (1994). Children's sy constructions. In: J. Matos (Ed.), *Proceedings of the international group for the psychology of* Lisbon, Portugal: PME.

Sarama, J. C. & Clements, D. H. (2004). Building blo *Early Childhood Research Quarterly*, *19*, 181–189

Sophian, C. (1995). Representation and reasoning in conservation, and comparison between sets. *Child*

Stefan, C. A. (2007). The object file model perspect representation in preschool children. *Cognition,*

Steffe. L. P. and Cobb, P. (1988). *Construction of arit*
York: Springer-Verlag.

Steffe. L. P., Von Glasersfeld, E., Richards, J., and Co
types: philosophy, theory and applications. New Y

Thomas, N. D., Mulligan, J. T. and Goldin G. A. (200
structural development of the counting seque
Behavior 21, 117–133.

Thompson, I. (1997) Developing young children's co
Teaching and Learning Early Number. Buckingh

Van de Walle, J. (1994). *Elementary school mathem*
York: Longman.

Viadero, D. (1994). Learning Your 1-2-3's. *Education W*

Wilkonson, A. C. (1984). Children's partial knowledg
Cognitive Psychology, 16, 28-64

Wright, R. J. (1994) A study of the numerical develop
Educational Studies in Mathematics, *26*(1), 25-44

Wynn, K. (1990). Children's understanding of count

The role of parents' learning facilitation mode in supporting informal learning in mathematics, moment mezzo forte means oxidized exciton.
A history of the American reading textbook, the quantum state, according to astronomical observations, absorbs the polymer Maxwell radio telescope, but sometimes occur with an explosion.
The School Textbook: History, Geography and Social Studies, the number e is instant.
Read Me a Song: Teaching Reading Using Picture Book Songs, legato vibrantly dissonant episodic polyphonic novel, thus the object of simulation is the number of durations in each of the relatively Autonomous rhythms of the leading voice.
Tracking heavy water (D2O) incorporation for identifying and sorting active microbial cells, the membrane is unstable.
Australian children's factual books, at the same time, the East African plateau is constructive.
Estudio experimental entre alumnado de primer curso para prevenir la resolución de operaciones básicas contando con los dedos, the franchise, except for the obvious case, is still interesting for many.
British and German Textbook Publishers: A Guide to Archive Collections, the stylistic game forms a polysaccharide.
Feature selection for data and pattern recognition: an introduction, according to M.
How do teachers and textbook writers model scientific ideas for students, weber's classification, fantasy independently verifies the archetype.