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AN

2004(2):MD1848 MATHDI

Title

Discovering mathematical generalizations via problem solving.

Author(s)

Sriraman, Bharath (Montana Univ. (United States))

Publication Date

2003

Source

Contributions to mathematics education 2003. Lectures.
Beitraege zum Mathematikunterricht 2003. Vortraege.
Editor(s): Henn, Hans Wolfgang
Gesellschaft fuer Didaktik der Mathematik (GDM) (Germany)
Hildesheim: Franzbecker. 2003. p. 613-616 of 691 p.
Conference: 37. Tagung fuer Didaktik der Mathematik, Dortmund (Germany),
3-7 Mar 2003
ISBN: 3-88120-354-0

Document Type

Book Article; Conference

Country

Germany, Federal Republic of

Language

English

Information Provider

FIZKA

Document Number

ZD3621324

Abstract

The ability to formulate generalizations and discover mathematical structures is an important aspect of mathematical thinking and a goal of pedagogy. Teachers can use problem-solving situations as a setting to enable students to develop a mathematical point of view, to engage in mathematical reasoning, abstraction and generalization. In this paper the author will present the results of two teaching experiments at a rural American high school and identify problem-solving situations that enabled students to create mathematical generalizations and discover mathematical structures. An instructional model that can be used by teachers in the secondary classroom will also be presented.

Classification Code

*E43 LANGUAGE OF MATHEMATICS (5TH TO 10TH YEAR OF SCHOOL, LOWER AND MIDDLE SECONDARY)

Klassifikation

*E43 SPRACHE DER MATHEMATIK (5.-10. SCHULJAHR, SEKUNDARSTUFE 1)

Special Terms

GENERALIZATION; GENERALIZING; PROBLEM SOLVING

Stichworte

VERALLGEMEINERUNG; VERALLGEMEINERN; PROBLEMLOESEN

Document 2 of 4

AN

2004(4):MD3178 MATHDI

Title

Reflective abstraction, unframes and the formulation of generalizations.

Author(s)

Sriraman, Bharath (Montana Univ., Missoula, MT (United States). Dept. of Mathematical Sciences)

Publication Date

2004

Source

The Journal of Mathematical Behavior. (2004) v. 23(2) p. 205-222.
ISSN: 0732-3123

Journal Title

The Journal of Mathematical Behavior

Document Type

Journal

Country

United States

Language

English

Information Provider

FIZKA

Document Number

ZD3643099

Abstract

In mathematics, generalizations are the end result of an inductive zigzag path of trial and error, that begin with the construction of examples, within which plausible patterns are detected and lead to the formulation of theorems. This paper examines whether it is possible for high school students to discover and formulate generalizations similar to ways professional mathematicians do. What are the experiences that allow students to become adept at generalization? In this paper, the mathematical experiences of a ninth grade student, which lead to the discovery and the formulation of a mathematical generalization are described, qualitatively analyzed and interpreted using the notion of unframes. It is found that reflecting on the solutions of a class of seemingly different problem-situations over a prolonged time period facilitates the abstraction of structural similarities in the problems and results in the formulation of mathematical generalizations.

Classification Code

*C33 COGNITIVE PROCESSES. LEARNING THEORIES (5TH TO 10TH YEAR OF SCHOOL,
LOWER AND MIDDLE SECONDARY)

Klassifikation

*C33 KOGNITIVE PROZESSE. LERNTHEORIEN (5.-10. SCHULJAHR, SEKUNDARSTUFE
1)

Special Terms

GENERALIZATION; ABSTRACT REASONING; LOWER SECONDARY; STUDENT OBSERVATION; PROBLEM
SOLVING REFLECTION

Stichworte

VERALLGEMEINERUNG; ABSTRAKTES DENKEN; SEKUNDARSTUFE 1; SCHUELERBEOBACHTUNG;
PROBLEMLOESEN

Document 3 of 4

AN

2004(5):MD4370 MATHDI

Title

Discovering a mathematical principle: the case of Matt.

Author(s)

Sriraman, Bharath (Montana Univ., Missoula, MT (United States). Mathematical Sciences)

Publication Date

Mar 2004

Source

Mathematics in School (Harlow). (Mar 2004) v. 33(2) p. 25-31.
ISSN: 0305-7259

Journal Title

Mathematics in School (Harlow)

Document Type

Journal

Country

United Kingdom

Language

English

Information Provider

FIZKA

Document Number

ZD3654053

Abstract

In this article the case study of Matt, a 14-year-old ninth grade (Ed: Year 10) student is presented. Matt was successful in discovering a mathematical generalization, which applied to five seemingly different problem-solving situations by verbally reflecting on the problems and abstracting similarities from the underlying structure of his solutions to three of the problems. This article investigates how problem-solving situations can be used in the early secondary classroom to help students formulate generalizations and discover mathematical principles. (Author's abstract)

Classification Code

*E43 LANGUAGE OF MATHEMATICS (5TH TO 10TH YEAR OF SCHOOL, LOWER AND MIDDLE SECONDARY)

Klassifikation

*E43 SPRACHE DER MATHEMATIK (5.-10. SCHULJAHR, SEKUNDARSTUFE 1)

Special Terms

FOUNDATIONS OF MATHEMATICS; GENERALIZING; PROBLEM SOLVING; CASE STUDIES

Stichworte

GRUNDLAGEN DER MATHEMATIK; VERALLGEMEINERN; PROBLEMLÖSEN; FALLSTUDIE

Document 4 of 4

AN

2003(6):MD4763 MATHDI

Title

Mathematical Giftedness, Problem Solving, and the Ability To Formulate Generalizations: The Problem-Solving Experiences of Four Gifted Students.

Author(s)

Sriraman, Bharath

Source

Journal of Secondary Gifted Education. (Spr 2003) v. 14(3) p. 151-65.
ISSN: 1077-4610

Document Type

Journal

Country

United States

Language

English

Information Provider

ERIC

Document Number

ZD3564527

Abstract

Nine freshmen in a ninth-grade accelerated algebra class were asked to solve five nonroutine combinatorial problems. The four mathematically gifted students were successful in discovering and verbalizing the generality that characterized the solutions to the five problems, whereas the five nongifted students were unable to discover the hidden generality. (Contains references.) (ERIC)

Classification Code

*C43 INTELLIGENCE AND APTITUDE (5TH TO 10TH YEAR OF SCHOOL, LOWER AND MIDDLE SECONDARY)
C93 OTHER EDUCATIONAL ASPECTS (5TH TO 10TH YEAR OF SCHOOL, LOWER AND MIDDLE SECONDARY)

Klassifikation

*C43 BEGABUNG UND FAEHIGKEITEN (5.-10. SCHULJAHR, SEKUNDARSTUFE 1)
C93 SONSTIGE ERZIEHUNGSWISSENSCHAFTLICHE ASPEKTE (5.-10. SCHULJAHR,

□ SEKUNDARSTUFE 1)

□ **Special Terms**

GIFTED; ELEMENTARY ALGEBRA; COMBINATORICS; GENERALIZING; MATHEMATICAL STRUCTURES;
MATHEMATICAL ABILITY; COMPARATIVE STUDIES; GRADE 9; LOWER SECONDARY; STUDENT OBSERVATION;
STUDENT CHARACTERISTICS; WORD PROBLEMS ABILITY IDENTIFICATION

□ **Stichworte**

BEGABUNG; ELEMENTARE ALGEBRA; KOMBINATORIK; VERALLGEMEINERN; MATHEMATISCHE STRUKTUR;
MATHEMATISCHE FAEHIGKEIT; VERGLEICHSSSTUDIE; KLASSE 9; SEKUNDARSTUFE 1;
SCHUELERBEOBACHTUNG; SCHUELERMERKMAL; TEXTAUFGABE

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