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**Library Resource Form Required for New Non-Gen-Ed**

**Submission Deadlines: Fall - October 11, 2005 Spring - February 14, 2006**

**TITLE** Course Revision: 0802552 from "Piaget and Elementary Mathematics Education" to "

Sponsor(s) Susan B. Taber e-mail: taber@rowan.edu  
e-mail:  
e-mail:

**DEPARTMENT** Elementary / Early Childhood Education  
**College** Education

If **LAS**-check:  History/Humanities  Social/Behavioral Sciences  
 Math/Science

UNDERGRADUATE  GRADUATE  
 New non gen-ed  Major  
 Short-Term non gen-ed  
 Minor curricular changes (fewer than three) to:  
 Existing non gen-ed course  
 Non gen-ed degree requirements  
 Major  
 Minor, specialization, concentration, track, certificate program

**Signatures Required: representing approval before the Senate**

Department Chair: [Signature] crane@rowan  
Department CURRICULUM Chair: [Signature] Mabe@rowan  
Academic DEAN: [Signature] taber

COLLEGE CURRICULUM COMMITTEE: Of \_\_\_\_\_  
Ap \_\_\_\_\_  
Nt \_\_\_\_\_

Signature: College Curriculum Chair \_\_\_\_\_

Signature: SENATE CURRICULUM CHAIR \_\_\_\_\_

Comments: \_\_\_\_\_

Signature: Executive Vice President/Provost: [Signature]  
Date: 6/7/06  
Approved:   
Not Approved: \_\_\_\_\_

Signature: REGISTRAR [Signature]  
Date: 6/14/06  
Course Description Received & Approved  
Hegis Taxonomy & Course # ELEM 02.552

Notification Forward:  
 SCC CHAIR  Academic Dean  
 IR  Department Chair  
 CAP  VP/Student Affairs  
 Registrar  Other-

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Course Proposal  
0802.552 Piaget and Elementary Mathematics Education

Change of course title  
Change of catalogue description  
Change of pre-requisite course  
Change of course objectives and content

Details:

- a. Change of course title from 0802.552 Piaget and Elementary Mathematics Education to 0802.552 Research on Children's Mathematical Learning

Change of Catalogue Description from:

“This course introduces the student to the works of Jean Piaget and especially those that have a direct bearing on elementary school mathematics. It also reviews Piaget's works recently written or translated into English. These works include ideas on children's conceptions of time, on children's conceptions of fractions and proportions, and on the relation of mathematics to genetic epistemology.

“This course is based on how children learn, not on how to teach, and it will enable the graduate student to see mathematics from the standpoint of the elementary school child as he progresses through the various stages of development. This course will aid the elementary school teacher in discerning a child's stage of development as a basis for determining the type of mathematics for which he is ready.”

to

“This course introduces the graduate student to theories of how elementary and middle-school students learn mathematics and to current research on children's thinking and learning of mathematics. It surveys research findings on the child's understanding of mathematical concepts such as number, operations, fractions and proportions, measurement, and space. The focus of the course is how children learn mathematics, and it will enable the graduate student to see mathematics from the standpoint of the elementary and middle school child.. This course will aid the teacher in discerning a child's understanding of mathematics as a basis for determining the type of mathematics instruction for which he/she is ready.”

- b. Sponsor: Dr. Susan B. Taber, Department of Elementary / Early Childhood Education
- c. Credit hours: 3 (no change)
- d. Course level: Graduate
- e. Prerequisites: Remove 0802.540 Contemporary Curriculum Processes/Elementary Mathematics

- f. Time and scale of implementation. Fall 2006  
It is anticipated that the course will be offered once a year, in the Fall Semester. It may be necessary to offer it twice during the 2006-2007 academic year because of the number of graduate students who need this course in order to complete their COGS in Middle Grades Mathematics Education.

#### Rationale

- a. Statement of “need” for such a change  
During the past 20 years a large body of research evidence on how children’s thinking about various mathematical concepts develops over time has been accumulated. Much of this research refines and extends Piaget’s theories of the stages of cognitive development by investigating and documenting the ways children think about particular mathematical concepts and principles, including the misconceptions which children often construct and the likely sources of those misconceptions. While Piaget’s theory of the stages of cognitive growth and his methods of inquiry about children’s thinking have provided a useful perspective for understanding the development of mathematical knowledge, familiarity with the research about how children develop understanding of specific concepts is also essential for the expert mathematics educator.

The proposed revision updates this course to acquaint the educational professional with the body of research evidence on children’s thinking and learning of mathematics and to engage professional educators in inquiry about how children’s understanding develops through discussions of theory, surveys of research evidence, and designing and conducting classroom research tasks that will provide insights into the mathematical thinking of their own students.

This course has not been taught for several years. It has, however, been included as a required course in two Certificate of Graduate Study programs. It has been approved as a required course in the Elementary Mathematics Education COGS for the College of Education’s Master’s Degree in Standards-Based Teaching and as one of two required mathematics education courses in the Certificate of Graduate Study in Middle Grades Mathematics Education housed in the College of Liberal Arts and Sciences Mathematics Department. The updating of the course content and broadening of the focus to include recent research on how children learn mathematics will provide an essential component of the pedagogical content knowledge (Ma, 1999; Shulman, 1986) needed by highly qualified teachers of mathematics.

- b. Statement of curricular effect: There are three mathematics educators within the proposed Department of Teacher Education who have the expertise to teach this course. The present Department of Elementary / Early Childhood Education is in the process of hiring a second Elementary Mathematics Educator. There will be sufficient personnel within the new Teacher Education Department to teach this course as well as the mathematics pedagogy courses that are required for the Elementary and Subject Matter Teaching Specializations.

No additional library resources will be needed as this is an update to an existing course.

**Essence of the Course:**

**a. Objectives**

From	To
<p>1. Reflect on and assess student behavior in terms of developmentally appropriate behavior using Piagetian concepts.</p> <p>2. Be an advocate for developmentally appropriate materials and practices in the teaching of mathematics.</p> <p>3. Demonstrate a developmentally appropriate instructional plan when teaching a mathematics lesson.</p> <p>4. Collaborate with others to develop appropriate scope and sequence in elementary school mathematics curriculum.</p>	<p>1. Describe students' understanding of mathematics concepts and procedures based on theories of learning and research evidence.</p> <p>2. Describe and be an advocate for developmentally appropriate materials and learning experiences for teaching mathematics, based on research evidence and theories of children's learning of various mathematical concepts.</p> <p>3. Develop an instrument for assessing and describing students' various understandings of a mathematics concept or related concepts.</p> <p>4. Develop and/or select developmentally appropriate learning goals and instructional plans for teaching mathematics to students who are diverse in terms of skill acquisition, language, understanding of mathematical concepts and vocabulary, and life experience.</p>

**b. Topical Outline/Content**

From	To
<ol style="list-style-type: none"> <li>1. A review of theories of intelligence</li> <li>2. Genetic Epistemology and mathematics</li> <li>3. Jean Piaget: biography and views of education</li> <li>4. Piaget's theory of intellectual development</li> <li>5. Logical classification</li> <li>6. First experiences with number               <ol style="list-style-type: none"> <li>a. a child's conception of number</li> <li>b. a child's conception of space</li> <li>c. a child's conception of time</li> <li>d. a child's conception of measurement</li> <li>e. a child's conception of Valuing. . . Ethics</li> </ol> </li> <li>7. Addition and subtraction</li> <li>8. Multiplication and division</li> <li>9. Fractions and proportion</li> <li>10. Time</li> <li>11. The growth of logical thought</li> <li>12. How a child begins to think about space</li> <li>13. From topology to Euclidean geometry</li> </ol>	<ol style="list-style-type: none"> <li>1. Theories of Mathematical Learning</li> <li>2. Piaget's theory of intellectual development</li> <li>3. Foundations of current research in mathematics education: e. g., Brownell, Dewey, Bruner, Vygotsky, cognitive science perspectives</li> <li>4. Seriation and classification</li> <li>5. Research findings on early arithmetic and out of school mathematics</li> <li>6. Research on children's understanding of number and number systems</li> <li>7. Research on children's understanding of addition and subtraction</li> <li>8. Results of traditional instruction/Misconceptions and "buggy algorithms"</li> <li>9. Research on children's understanding of multiplication and division</li> <li>10. Research on children's understanding of fractions and decimals</li> <li>11. Research on proportional reasoning</li> <li>12. Research on children's understanding of space and Van Hiele's levels of geometric understanding</li> <li>13. Comparison of theories of global reorganizations of knowledge vs. situated cognition and problem solving</li> </ol>

**c. Evaluation of students and grading procedure**

As in other courses, students will be evaluated on the basis of preparation for and participation in class discussion, short and long papers, and written examinations (in-class or take-home). Expectations for assignments and grading standards will be shared by the instructor with the class members when assignments are given.

**d. Evaluation of the course**

The course will be evaluated by means of student evaluations of the course as well as review by the department curriculum committee and the department.

**Results of consultations: Consultations were sought from**

Dr. Ronald Czocho, Department of Mathematics

Dr. Frank Orlando, Department of Secondary Education / Foundations

Dr. Gregory Potter, Library

New Catalogue Description:

0802.552 3 s.h. Research on Children's Learning of Mathematics

This course introduces the graduate student to theories of how elementary and middle-school students learn mathematics and to current research on children's thinking and learning of mathematics. It surveys research findings on the child's understanding of mathematical concepts such as number, operations, fractions and proportions, measurement, and space. The focus of the course is how children learn mathematics, and it will enable the graduate student to see mathematics from the standpoint of the elementary and middle school child. This course will aid the teacher in discerning a child's understanding of mathematics as a basis for determining the type of mathematics instruction for which he/she is ready.

**Rowan University**  
Campbell Library

Library Resources Form

Department/School: College of Education – Dept. of Elementary/Early Childhood Education

Proposed by: Dr. Susan Taber

**Proposal:** Piaget and Elementary Mathematics Education (0802.552) (Graduate)

Anticipated Date for Course/Program Offering: Fall 2006

**Resources that should be acquired**

No extraordinary additional resources are needed at this time.

**Resources available in Campbell Library**

The library has significant, up-to-date book and multimedia titles within the general Library of Congress subject areas of elementary education and mathematics education.

With vendor approval plans in place for both education publishers and university presses, the library captures new imprints in education, the humanities, and the physical and natural sciences.

**List key periodical resources**

Campbell Library is fortunate to have access to online journal databases in a large number of academic subjects, including the arts, humanities, literature, education, mathematics, philosophy, psychology, the physical and natural sciences, and the social sciences. Access to worldwide, regional, and local newspapers is also provided, including alternative press publications.

Of particular significance are the key education databases, Education Full-Text and ERIC. These provide access to over 2,000 major journals, many of which are full-text, in all areas of educational theory and praxis. Also, the library provides the MathSci database, which is the American Mathematical Society's index to over 2,000 journals and conference proceedings.

Other important databases include PsycINFO and Sociological Abstracts, key journal databases in psychology and the social sciences, respectively. In addition, Academic Search Premier, a large general academic database, and ABI-Inform, a large

database in business and related fields, provide access to over 4,500 journals, including those covering curriculum planning and development, school administration, personnel administration, and management. Elsevier SciDirect additionally provides full-text resources in education and the social/behavioral sciences.

**Librarian remarks**

Given the library's current book holdings and online journal access, this course can be supported. Additional funds are available for collection enhancement, if needed.



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Gregory C. Potter  
Liaison

2/1/06



**TO:** Susan Taber, Dept. of Elementary/Early Childhood Education

**FROM:** Ronald J. Czochor, Chairman *Ronald J Czochor*  
Mathematics Dept.

**DATE:** February 2, 2006

**RE:** Consultation on proposal to change *Piaget and Elementary Mathematics Education*

Members of the Mathematics Department with a special interest in this course have reviewed the proposed changes to *Piaget and Elementary Mathematics Education* (0802.552) and have asked me to support the proposed changes. We have reviewed this course with the knowledge that it will be used as one of the two mathematics education courses in the Middle School Mathematics Education COGS, and we acknowledge that the proposed changes will provide a more relevant course for students working toward this certificate.



*Department of Secondary Education/Foundations of Education*

## LETTER OF CONSULTATION

February 3, 2006

Dr. Susan Taber, Chair  
Department of Elementary/Early Childhood Education  
College of Education

Dear Dr. Taber:

This letter is in support of your proposal to update the content of course number 0802.552 Piaget and Elementary Mathematics Education and change the title to 0802.552 Research on Children's Mathematical Learning.

I have reviewed the course proposal, and received input from Dr. Jill Perry, and I believe that the rationale and change in content is more reflective of contemporary research and trends in this area. The change in title is also more representative of the revised course content. Further review shows that the content of the proposed course does not duplicate the content of other course offerings in this area.

I believe that the proposed change will strengthen our programs in mathematics education.

Sincerely,

Frank J. Orlando, Ed.D.  
Chair, Secondary Education/Foundations of Education