

**Applicability of Jean Piaget’s Conservation Task to Sri Lankan Children**

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**1. Introduction**

Cognitive Development is the study of how the thought develop in children and young people, and how they become more efficient and effective in their understanding of the world and their mental process (Oakley 2004). Children’s thinking is different from adults thinking. As a child develops, it’s thinking changes and develops. Cognitive Development is a major area study within Developmental Psychology.

Many researchers ( Beilin & Pufall 1992; Gruber & Voneche 1977, Holford 1989; Mogdil & Mogdil 1982) noted that, no theory has had greater impact on developmental Psychology than that of Jean Piaget.

Piaget described how children develop intelligence in stages. It is important to examine these stages to understand children’s conception of conservation and space. Therefore, this section provides an account of stages of development as Piaget has presented.

Piaget’s theory of cognitive development was based on three main principles namely assimilation, accommodation and equilibrium (Oakley, 2004).

Piaget’s book titled “La Genese du nombre chez l’enfant” translated in to English (The child’s conception of Number) published in 1952. He organized the book in three main parts as:

- (i) Conservation on quantities,
- (ii).through the notions of cardinal and ordinal correspondence,
- (iii).additive and multiplicative compositions

The present study is deal with the conservation on quantities to Sri Lankan children. Jean Piaget conducted test in the concept conservation on quantities under the titles conservation of continuous quantities and conservation of discontinuous quantities.

Piaget described the importance of the concept of conservation (Piaget 1952) as follows

*“It is a matter of common knowledge that in the field of empirical sciences the introduction of the principle inertia (conservation of rectilinear and uniform motion) made possible the development of modern physics and that the principle of conservation of matter made modern chemistry possible.....Obviously, conservation which is a necessary condition of all experience and all reasoning, by no means exhausts the representation of reality or the dynamism of the intellectual processes.....Our contention is merely that conservation is a necessary condition for all rational activity, and we are not concerned with whether it is sufficient to account for this activity or to explain the nature of reality”.*

Teacher training programmes in Sri Lanka are greatly influenced by Piaget's Theory (Talagala 2004). The Open University of Sri Lanka conducts a certificate programme for the Pre-School teachers and 'Development of mathematical Skills' (ESC1136) is a compulsory course in this Programme. The content of this course is mainly based on Piaget's cognitive development theory. The content consists of concepts of conservation (Session 5) Likewise, the content of the subject Mathematical concepts in the pre-School teacher training programmes conducted by the National Institute of Education and Eastern University of Sri Lanka is also based on Piagetian concepts.

Sri Lankan primary school is divided in to three key stages. Sri Lankan Primary Mathematics syllabi consist of six main topics – Numbers, Mathematical Operations, Measurement, Money, Space and Shapes, and Data Handling (Mukunthan, 2013). But other than these six concepts, the pre-number concept also in the key stage1 syllabus these concepts are mainly based on Jean Piaget's concepts.

Considering the importance of these concepts in later learning of mathematics and the attempts of teachers to develop these concepts in young children, the researcher felt Sri Lankan teachers would benefit immensely by investigating into the applicability of children's conception of 'conservation' and presented in Piaget's theory to Sri Lankan Context.

Many studies have been conducted to find out the universal applicability of Piaget's Theory (Santrock 2001, Chen and Menglan 1983). Greenfield (1966) carried a series of researches among Wolof children in Senegal, West Africa, to identify whether 'concrete operational thought' in Piaget's theory is universal. She found only 50% of the children between the ages of 10-13 years understood the principle of conservation. Another study was conducted in Australia to find out whether the child's ability to use the concept of conservation improves if he comes from a culture where conservation is not widely practiced (Dasen Ngini and Lavalee, 1979). The study found even with training aboriginal children were far behind the white children in Canberra.

In contrast, a study conducted on children's understanding of spatial concepts found that the ability to deal correctly with spatial concepts improved with age (Dodwell, 1963) as Piaget has stated but a clear progression from one type of thinking about space to a another was not evident. Citing empirical studies Newcomb and Huttenlocher (2000) suggest that infants have the ability to identify specific locations in space. This has challenged Piaget's view that children do not attain spatial competency until middle childhood.

Mukunthan 2013 carried out a study on applicability of Piaget's liquid conservation to Sri Lankan children with 60 children (15 children from the each 4-5 years, 5-6 yers, 6-7 yeara and 7-8 years groups). He noted based on his sample, Piaget's liquid conservation is applicable to Sri Lankan Children.

Piaget developed his theory of cognitive development in a cultural context which is dissimilar to the Sri Lankan context. Nevertheless, the influence of Piaget's Cognitive development theory is evident in early childhood education and primary education. Therefore, considering the impact of Piaget's Cognitive Development Theory in the education of our children and conclusions of studies conducted on the applicability of his theories to different cultural contexts, the researcher feels

that the problem whether children’s conception of ‘conservation’ are applicable to Sri Lankan children, should be investigated.

**2. Sample**

Targeted population of the present study is children between the ages of 5-10 years studying in Primary schools in urban rural and estate sectors in the Kalutara District, Sri Lanka. The education district in focus was Kalutara district which can be considered as a district typical of many of those in Western province and Southern provinces of Sri Lanka (Nanayakara, 1994).

The Population of the primary school children will be all the children between the ages of

5-8 years attending primary schools in Kalutra District. There are fifteen children sectlect from each 5-6 years, 6-7 years and 7-8 years groups. Population will be collect from the Zonal Education Office of Kaluata district. Sample of five age groups are shown in the table.

**3. Method**

Jean Piaget’s methods were followed as closely as possible.

**(i). Conservation of Continuous Quantities**

Child was first given two cylindrical containers of equal dimensions (A1 and A2) containing the same quantity of liquid (as indicated by the levels). The contents of A2 is then poured into two smaller containers of equal dimensions (B1 and B2) and the child was asked whether the quantity of liquid poured from A2 into ( B1 and B2)was equal to that in A1.

(ii). the same procedures as with continuous quantities described above were performed with green gram.

**4. Results**

The results of the study and Piaget’s study are given in the following table.

**Table 2**

Children’s responses

Age group	Test	Present Study		Piaget’s Study	
		Correct	Wrong	Correct	Wrong
5-6 Years	continuous	2	13	0	4
	discontinuous	1	14	0	7
6-7 Years	continuous	10	5	1	1
	discontinuous	9	6	2	1
7-8 Years	continuous	14	1	1	0
	discontinuous	12	3	4	0

As the table above shows all the subjects in Piaget's sample (100% for both items) and a majority (87% and 93.33% respectively) in the Sri Lankan sample failed to complete these tasks. This shows that a majority of subjects do not possess the conception of quantity of liquid at the age of 5-6 years. The chi square test indicated that there is a significance difference between Piaget's findings and the present study ( $P < 0.05$ ).

The table reveals that, one subject from the present study has the conception and the no one from the seven in the Piaget's sample has the discontinuous quantity conservation. Chi square test indicated that, there is significance difference between the findings of the both studies ( $p = 0.0$ ) at the 5-6 years age range. Therefore, it can be concluded that, Piaget's conservation task is not applicable to Sri Lankan Children in the age range 5-6 years.

The table reveals that, 66.67% of the children in the present study and 50% children of the Piaget's sample have the conception of liquid conservation in the 6-7 years age range. But 60% children in the present study and 66.67% children from the Piaget's study showed the conception to the task discontinuous quantity conservation. The chi square test indicated ( $P$  values are greater than 0.05) there is no difference between the both studies. Therefore it can be concluded that, Jean Piaget's conservation task is applicable to 6-7 years children in Sri Lanka.

The tables above shows all the children in the Sri Lankan sample are yet to acquire the ability to conserve **quantities and invariance of whole'**. However, when compared to the percentages of children in the previous age range who have this ability (66.67%, and 66.67%) the percentages of children in this age range has been increased (93.33%, and 80%). According to Piaget's study all the children have performed correctly for all the items within this age range.

The chi-square tests computed has also shown that there is a significant difference in the achievement levels of Sri Lankan sample and the achievement levels of Piaget's sample in relation to all the items ( $P$  Values = 0.01, and 0.00 respectively).

According to the sample it can be concluded that, there is significant difference between both studies.

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