



Modern Elementary School: Neutrosophic and Education

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Abstract

Elementary school is a stage of primary education, it's the most critical stage of education in general, and teaching during the elementary stage is one of the most influential periods for children. In this stage, pupils can develop their basic skills and information through elementary education. In this study, we hope to insert the concept of neutrosophic logic in elementary school curriculum to clearly define the logic for pupils using shapes, figures, games, graphs, or mathematics problems that contain some indeterminacy. These neutrosophic examples include some indeterminacy which is the basic compound for neutrosophic logic. The basic difference from classical logic, further to other compounds (truth, falsehood).

Keywords: Modern elementary School; Neutrosophic logic; The neutrosophy mathematic; Neutrosophic education games.

1. Introduction

The primary school starts the first stage by giving basic information and principles that are required for scientific and professional development such as in language, mathematics, science, geography,....etc.

All life and scientific fields contain phenomena, cases, and problems that are difficult to explain by classical logic, therefore, we are placed to insert modern logic (Neutrosophic logic) that contributes to understanding these phenomena and helps the development of curriculums that are taught at elementary (primary) school level which brings new technics and concepts to the table.

Neutrosophic logic is introduced by FlorentinSmarandache in 1995, which was the key to solving many problems and phenomena that contain some ambiguity and contradiction. In this paper, we hope to insert the concept of neutrosophic logic in some of the curriculums that pupils study in the primary stage.

Primary school is considered the first point that feeds the pupils with basic information in all kinds of sciences. Neutrosophic logic is considered an extension of classical logic, fuzzy logic, and intuitionistic fuzzy logic. Smarandache [3, 4, 5] and Salamaa. et.al [7, 6] presented the fundamental concepts of a neutrosophic set. Smarandache extended the fuzzy set to the neutrosophic set [1, 3], introducing the neutrosophic components where T, I, and F which represent the membership, indeterminacy, and non-membership values respectively, where $]0, 1+ [$ is the non-standard unit interval.

Smarandache presented neutrosophic statistics, in which data can be enigmatic, vague, imprecise, incomplete, and even unknown. In modern education according to neutrosophic logic, the teacher should teach pupils the concepts that contain some indeterminacy for any curriculum, by using

modern learning methods, such as; adding options on the classical technique that has shapes or vague pictures that are difficult to identify according to the classical approach.

2. Some Definitions

Definition 1:- Define neutrosophic logic as the logic in which each issue or matter is calculated as the percentage of (truth, indeterminacy, or falsity) in a triplet (T, I, F), respectively, where T, I, F are called neutrosophic components and they belong to the interval [0, 1].

Definition 2:- A new branch of philosophy that consider the origin, nature, and scope of neutralities, as well as their interactions with each other, called neutrosophy.

Definition 3:- Suppose X is a nonempty set. A neutrosophic set N is an object having the form $\{x, (T(x), I(x), F(x)):x \in X\}$, where $T(x)$, $I(x)$, and $F(x)$ which represent the degree of truth-membership function, the degree of indeterminacy, and the degree of falsehood-nonmembership, respectively of each element $x \in X$ to the set N .

3. Neutrosophic Logic In Elementary School

Introducing students to the concept of neutrosophic logic is an important step in modern knowledge since it includes modern education methods that are consistent with this logic so that they contain some ambiguity and indeterminacy. The educational process is carried out through methods, ways, techniques, and procedures that include some indeterminacy, and are enhanced with drawings, pictures, and various shapes.

For students to become familiar with this logic, we included several examples.

For example; adding some options on the classic method, especially for indeterminacy data, such as adding ambiguous shapes or images, or adding a field that contains irregular or extreme data. Further an incomplete or distorted picture; geometric shapes in which some sides are unclear, or cut; questions not understood or maybe have missing data.

In this case, the student will start to distinguish between shapes or drawings which are ambiguous and shapes or drawings that are clear. The pupils will be accustomed to previously (in the classic logic), and here the student will be able to distinguish between the correct shapes and incorrect shapes (indeterminacy) (that contain some ambiguity or uncertainty). For this we include a new define to purpose:

Indeterminacy shapes : Indeterminacy shapes (patterns) are the patterns (or shapes) unknown (irregular) first impression by the pupils. after determining the regular shapes, pupils will distinguish these types of irregular data. As explained in the next sections.

4. The Neutrosophy Mathematic

Mathematics plays an important role in education and life as a whole, as it is the language of sciences, and it is difficult or sometimes impossible without using its tools such as terms, equations, and models to express many scientific concepts in various fields, all using classical logic. But science is advancing further and complex problems are increasing, therefore, there is a strong need to extend the classical logic to include previous cases. The logic considered an extension (generalization) of classical logic is neutrosophic logic.

5. The Mechanisms of Teaching Neutrosophic Logic

In this section, we introduce some mechanisms of teaching neutrosophic logic to be included in the school curriculum studied by the pupils in the school with simple information about neutrosophic logic, further introducing new mechanisms for learning and teaching proportionate to this logic, such as:

- Insert multiple pictures of one shape, but one of them contains some confusion or ambiguity, or a small part of it is cut.
- Use homogeneous shapes: differences in their 3D toys with the inclusion of one or more pieces that are different from the rest.
- symmetrical shapes, some of which contain discrete points.

In all previous cases, we require pupils' to select different shapes (which contain indeterminacy).

6- Some Neutrosophic Education Games

In this section, we introduced some methods of education to learn neutrosophic logic

- **Matching game**

An interesting motion game for pupils, print pictures of many things, and each picture has two copies, and print another copy contains some indeterminacy (not matching).

We will raise the pupil's attention to the difference between the original image and the other un-matching picture. then we take a copy of each picture and spread it upside down on the ground, then show them a picture and the pupils must find the matching image, then we go to the next image, and so on.

- **Education Game: fly or not fly**

Pupils love birds, but do they know them? Make the children stand in front of you in a semicircle and then mention to them the names of animals and birds. If the animal is flying, they raise its hands like wings and move them.

If it does not fly, their hands should remain steady, and the one who makes mistakes come out of the game and the winner remains the last one.

Here, present some distorted or unclear pictures of animals that are flying or not flying, and the pupils should determine if the animal is known or not (we got indeterminacy).

- **Who is he?**

Who is the owner of the picture

Put a picture on a card and stick it upside down and ask the pupils questions and wait for their answer with yes or no until they reach the correct solution. You can put pictures of animals, food,..., etc. but if take an unclear picture (indeterminacy), in this case, we have the third answer is indeterminacy.

- **Other Examples**

In the game of Snake and Ladders, it is a game if the head or part tail of the snake is unclear or erased, then we cannot put the dice in any place in the game and this is considered indeterminacy.

The same applies to the stairs if the beginning or mid, or end of the stairs is unclear or erased, the place of a die is not specific and here it is considered indeterminacy.

we can apply neutrosophic logic concepts in many elementary schools, choose any class, then insert methods or examples about mathematics, such that these examples contain some pictures, graph, and questions of mathematics which is not understood or missing some information, for example:

1- If we take the following shapes and ask the pupils in the class, which shape is different according to shape?

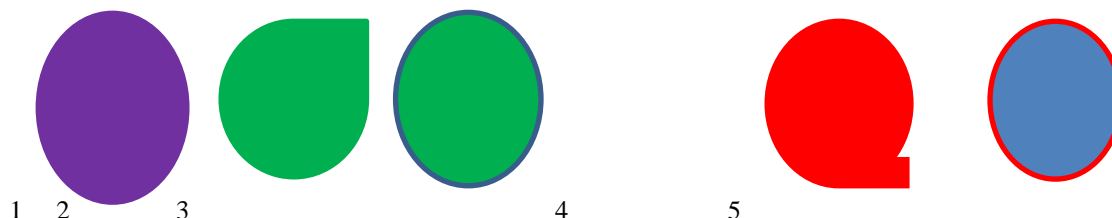


Figure (1)

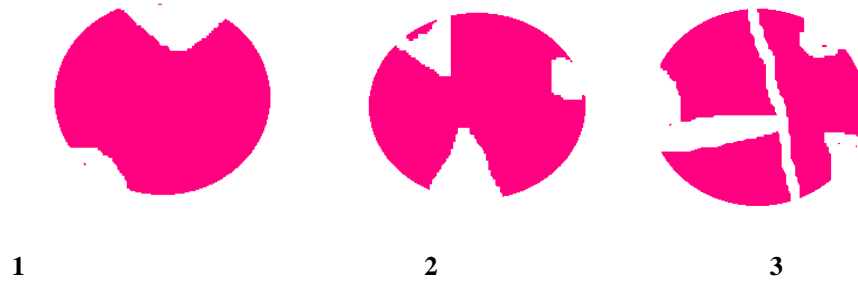


Figure (2)

We note the above figure(1): (1,3,4,6), all the shape represents a circle. But the shapes (5,2), are undetermined, so all the shapes in figure(2): (1,2,3) are indeterminacy.

2- Pentagonal clear in figure(3) is 2, but 1,3,4, are not understandable (indeterminacy).

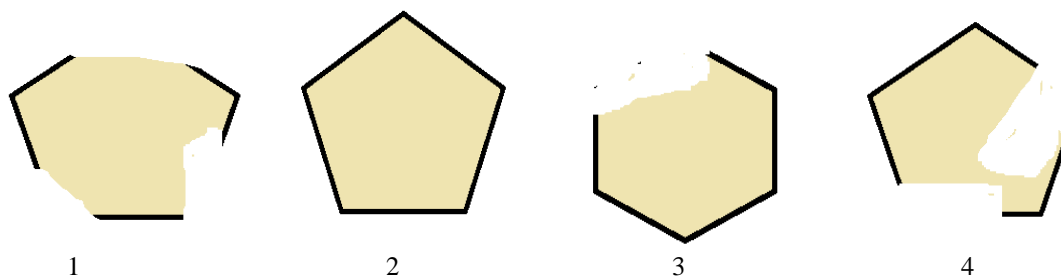


Figure (3)

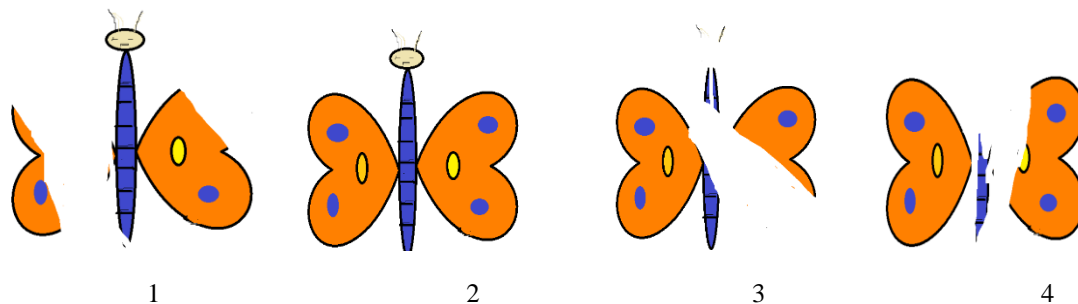


Figure (4)

Here in this figure, the butterfly is clear in 2, while in 1,3,4, unclear (this indeterminacy).

3- Learn The Pattern

The pattern topic is one of the subjects of mathematics that a pupil learns in the early stages of elementary school.

A pattern is defined as the regular repetition of something so that what will happen next can be expected and the pattern has various shapes:

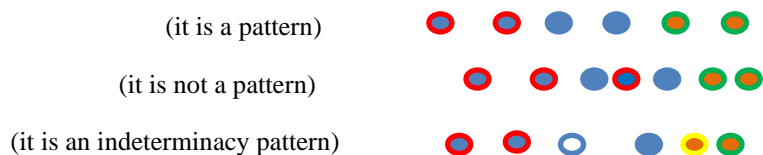
- Type of geometric

▲▲■▲▲■ (it is a pattern)

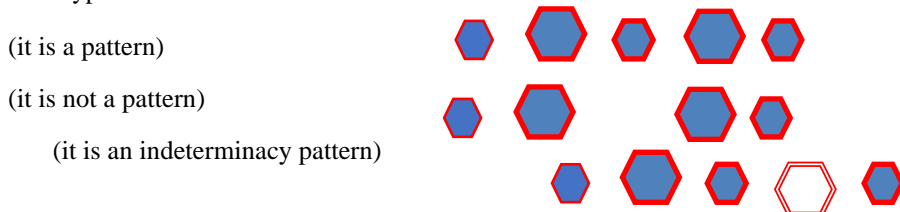
▲▲▲■▲▲ (it is not a pattern)

▲▲■▲▲■ (it is an indeterminacy pattern)

- Type of color



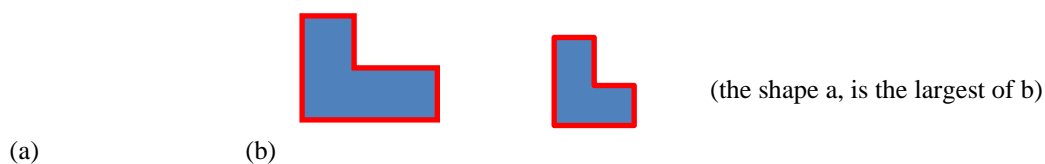
▪ Type of Size



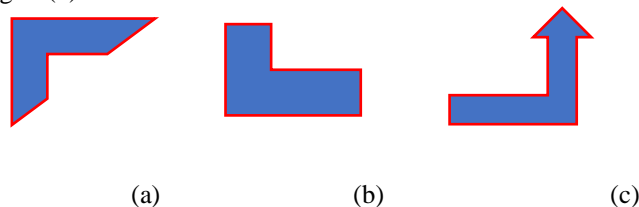
4- circular objects such as balls, glass balls, rings, compass Non- circular objects, eggs, elliptical, the eye

Indefinite things, combining elliptical and circular or ambiguous, a circular-shaped seal placed on it a rectangular shape, a circular-shaped seal with a pointed edge, a round-shaped brooch but its edge has a decoration.

5- The smallest and largest



Figure(5)



Figure(6)

In figure (5), we note the easy to determine the small or large, while in figure(6) it's difficult or unclear to determine which one is small or largest, in this case, is called indeterminacy.

7. Conclusion

Knowledge development is considered the basis for keeping pace with scientific and knowledge progress, so new logic to primary education was introduced which depends on the indeterminacy part for any event, item, problem... or shapes. this logic is defined as neutrosophic logic that was introduced in various sciences.

We have proposed a new approach to identify neutrosophic logic in the early stages of education by simplifying and exploring this logic and presenting it in shapes, pictures, mathematical problems, or geometric shapes that contain the indeterminacy part.

We shed light on the importance of mathematical problems. various examples of geometric, educational, and mathematics have been introduced.

8. Future work

- 1- We can do particular applications in some elementary schools, and record how many pupils can distinguish indeterminacy shapes or Unknown shapes by student for basic mathematical proof using Turiyam cognition [14-16].
- 2- Because this logic is very modern and is applied in many fields of life, we must introduce it to pupils through their games and curriculum by multi- methods; in this paper, we inserted some examples of mathematics, which can apply to other unknown scientific topics beyond the Neutrosophic [16].

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