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Abstract. Multiple intelgence is a ability to solve problems and create a products that have cultural values, such as kinesthetic intelligence, interpersonal, verbal linguistics, logical mathematical, naturalist, intrapersonal, visual spatial, and musical. The focus of this research is to know one of the intelligence held by the students of spatial visual intelligence in general biology course. The sample of research is the students of the first semester in year 2017/2018 (N=20). There are two treatments given to the student that is making cell parts both in animal cells and plant cells according a prior knowledge, and concept. The analysis data was statistic descriptive by calculate the mean value and grouping it into three categories that is high, medium, and low. The result of mean obtained for prior knowledge is cell shape 1,2 and 1,6 for a concept. The categorization as follows: prior knowledge about cell shape is high (0%), medium (15%), and low (85%), while on understanding of cells according a concept is high (5%), medium (60%), and low (35%). There is a change on concept understanding in making cell shape once they learn the actual cell shape.

1. Introduction

Each individual significantly has a different intelligence and has existed since birth period, the intelligence owned needs to be developed in learning. Intelligence is often defined as a common mental ability to learn and apply knowledge in manipulating the environment as well as the ability to think abstractly. The intelligence also includes the ability to adapt new environments, evaluate and assess, understand complex ideas, productive thinking, learn fast, learn from experience and even the ability to understand relationships [1]. Gardner stated eight intelligences for human; logical-mathematical, verbal linguistic, visual-spatial, musical, kinesthetic, emotional, naturalist, intuition, moral, existential, and spiritual [2].

Spatial intelligence is an ability to accurately perceive the visual world, transform and modify one's visual experience, even when no relevant physical stimuli exist. This intelligence includes the ability to imagine, present the idea visually-spatial, orientate precisely in atriks spatial. [3] arguing after the theoretical perspective from Gardner intelligence can be seen in the field of neuroscience. The connection between how the mind is organized and the education of students suggests a need for additional classroom teaching and testing applications. A key issue in visual learning is the transition from perception to cognition, the spatial representations are especially important in all branches of biology (in developmental biology time becomes an important dimension), where 3D and 4D representations are crucial for understanding the phenomena. Visual and spatial in science learning,

considers the role of visualization in the conception, formulation and communication of ideas in science. Emphasises of the transformational power of visual and spatial representations, arguing for a wide applicability of this notion in science learning [4]. Learning methods learning by doing are assumed can directing learners because making lessons to be challenging and impressive. With these methods, it's expected that the learning experience gained has meaning and is not easily forgotten by learners. Therefore, to avoid uninteractive learning, promote active thinking and assist students' memory on cell, it requires a method and media to practice their imagination. The purpose of this research was to determine the basic knowledge (prior knowledge) of the students, especially the visual-spatial intelligence using playdough as media in understanding the shape of cell on biology class. This is in accordance [5] there should be further research on the mastery concept by applying visual spatial in natural science.

2. Method

This research use a descriptive research, descriptive research is a type of quantitative research that involves making careful descriptions of educational phenomena [6]. The participants were the first semester students (N = 20) in academic year 2017/2018. Study program of Biology Education. Faculty of teacher training and education of Hamzanwadi University-Selong-Lombok Timur-West Nusa Tenggara. The content of class material discussed structure and the function of animal and plant cells. There were two treatments given, manipulating the parts of cell both animal and plant by two determinations; prior knowledge and by concept. The instructions were to manipulate/make the shape of cell of animal and plant based on what they knew when they learnt biology at secondary school. The purpose of doing this was to identify students' visual spatial intelligence. Some students manipulated the shape of cell incompatible with the shape of cell in general, a shape and name did not fit each other. A day after test of prior knowledge, the students learnt for themselves about the concept of the shape of cell for animal and plant and then asked them to reconstruct the shape of cell. Data analysis by calculation of the mean score was performed and grouping it into three categories; high, medium, and low. The categorization based on the score obtained by the conceptual accuracy with the shape made, as category considered, high = 3 (name and shape matched), medium = 2 (Name matched and shape did not), low = 1 (Name and shape did not matches).

3. Results and discussion

Spatial intelligence is an ability to make changes on perceptions, involving sensitivity to existing lines, shapes, spaces, and relationships. This intelligence can be visualized into two and three dimensional forms [7]. Visuo-spasial learning is best performed for developing spatial intelligence, this intelligence helps someone think, solve problems involving spatial orientation and object move on space, readable maps or navigate and possess good direction skills. One of the key cognitive abilities of visual-spatial intelligence is sculpting and building. Sculpting and building is applying the same basic processes described in visual illustrating but using different media: clay, papier-mâché, building materials, tinfoil, or anything else that can be shaped. These activities tap a different set of cognitive abilities often associated with architects, inventors, or sculptors [8].

The process of receiving insight into knowledge takes place through various interactions with objects and environments using their senses. This can be reflected by seeing, hearing, touching, smelling, or feeling, one can know something. Before the process occurs, there is no harm to knowing earlier about the ability/mastery of students by providing test. The test referred to this study was not giving test in form of written but in the form of masterpiece made of play dough.

The shape is one of the earliest concepts to be mastered, since it can be used to distinguish objects on the basis of form first before based on other characteristics. There is a change of knowledge that occurs but not much after the student learn of cell shape concept (presented in the figure 1).

Figure 1. An example of a cell shape created by a student.

The left cell shape image was based on the students prior knowledge, and the right image was after the student learnt cell shape by concept. Finding on observation during the process of manipulating the shape of cell in second attempt (manipulating the shape of cell by concept), there were mistakes to form and give name of cell made, however, there was also a change of form in making the shape of cell. This result seemed to be satisfied as students applied their imagination into a masterpeice. Each of masterpiece made then analyzed by calculationg the mean score and categorized them into high, medium and low (see figure 2 and figure 3).

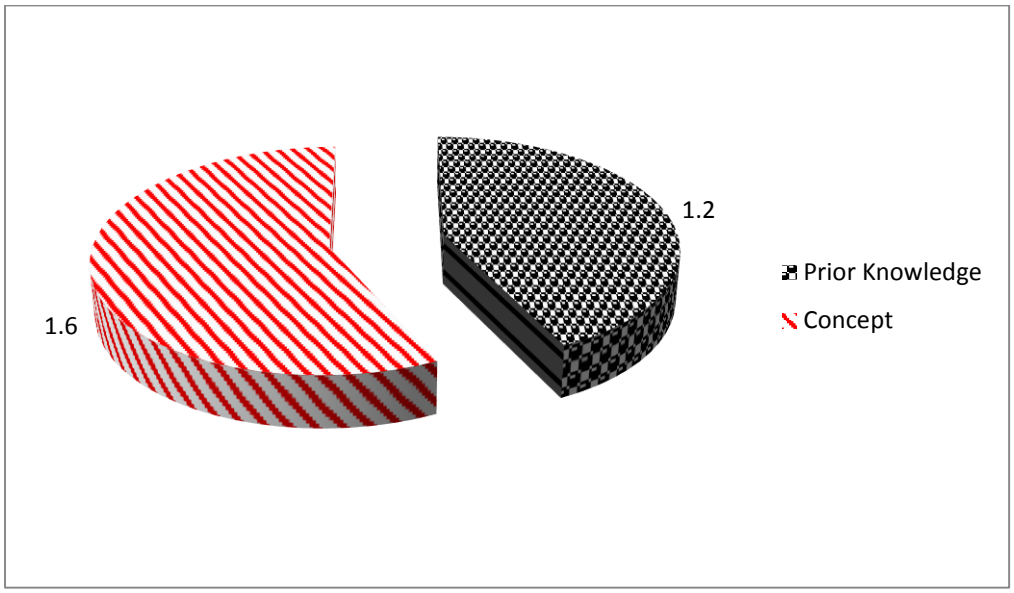

Figure 2. The mean value of making cell structures (prior knowledge and concepts).

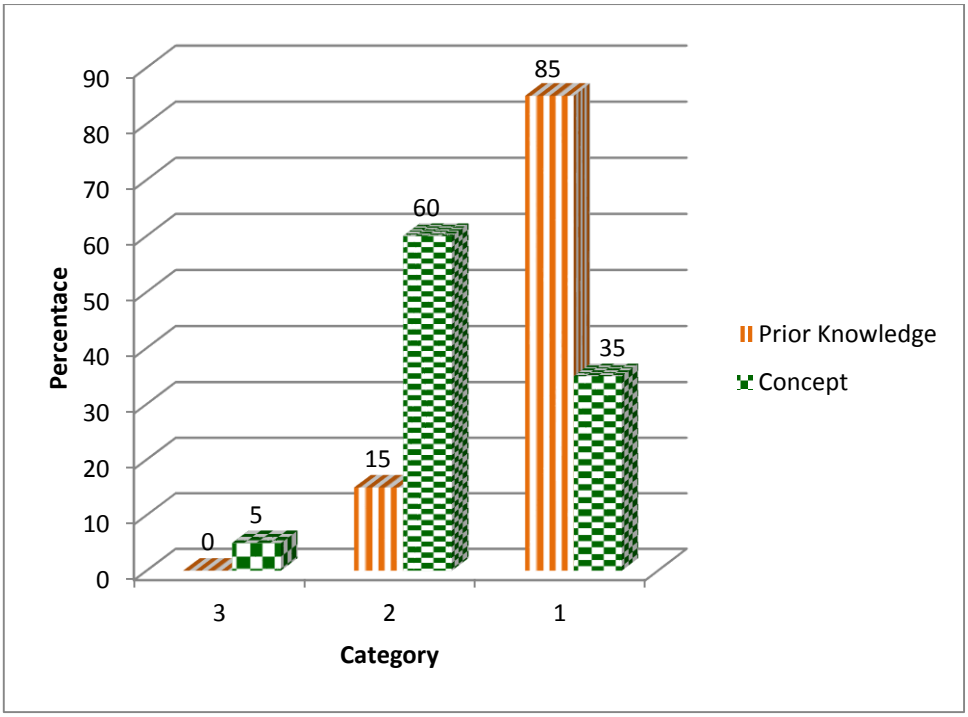

Figure 3. The category of making cell structures (prior knowledge and concepts).

Basically, the visual spatial intelligence of students was already visible at the time of prior knowledge test in manipulating the shape of cell from play dough, they could produce shapes, created patterns, applied for colour which the shape and name did not match the form of cell they learnt previously**.**

Manipulating the shape of cell with various media involves hands-on and mind-on activities; both must be balanced in terms of self-understanding and public use. [9] stated three subcomponents and test for measuring the spatial factor that is (1) spatial relation; ability to perform rotation and comparisons of bi-an three dimensional cubes, (2) Spasial visualization; ability to manage complex visual information to obtain a correct solution, (3) Spatial orientation; physical and mental orienteering ability in the space. To develop visual spatial intelligence, it needs to be continuously trained to be more comprehensive in visualizing what has been imagined, learned and able to present it in good manner, precisely high accuracy. According to Bertel et. al, constructing the 3D form is a visuo-spatial thinking activity which involves very dynamic internal and external models related to perception, reasoning and design activities [10]. Furthermore, Golon stated that the best way to identify the visual-spatial learner is by taking a comprehensive history which includes the early and current health of the child, using a checklist of characteristics and asking the child to complete tasks involving auditory sequential processing and those utilising visual-spatial abilities and comparing the results [11]. Spatial ability is the ability to produce, save, take and change the visual image structure that has been formulated in the mind and manipulate it [12].

Through the visual learning system, the learner recognizes the object, distinguishes size and shape, senses depth, notes colour, and uses visual-spatial awareness to predict where he is. In schools, spatial visual learning underpins various disciplines science such as reading, math, science, art, and athletics. The results of research on the use of visuo-spatial model to improve the cognitive ability of biology teacher candidates in the course of plant anatomy have been done descriptively; spatial visual model is a learning model involving three dimensional ability (3D) [13].

Multiple intelligence approaches make the learning process in the classroom more effective and success. Multiple Intelligence approaches helps teacher engage students through their natural curiosity and increase students participation through their excitement [14]. [15] With the study of implementation

visual spatial that is visual spatial pooling can be learned in a much simpler way using strong dimension reduction based on principal component analysis. Visual-spatial intelligence is encoded in shapes, images, patterns, designs, colours, textures, shapes, and images that we can observe either with the physical eye or with inner eyes. Thus, working with taxonomy of cognitive ability for this intelligence will involve knowing, analyzing, and processing information through images, shapes, colours, textures, and patterns. Practically, this means using a variety of visual media - including colour markers, construction papers, paints, factories working with clay and other sculpting media; and using photography and video recording. It also includes a number of "inward" abilities, including such things as visualizing, pretending, imagining, forming mental images, and guided imagery processes [8]. [16] The essence of visual–spatial thinking and the development of visual–spatial literacy, consider the application of the visual–spatial thinking to biology education, and propose how modern technology can help to promote visual–spatial literacy and higher order thinking among undergraduate students of biology. Visual–spatial thinking necessarily involves vision, which is a process of using the eyes to identify, locate and think about objects, and orient ourselves in the world.

4. Conclusion

Basically, students have visual spatial intelligence from beginning of learning but the intelligence needs to be sharpened, trained, and developed in the learning process using techniques, media that match the material characteristics and this intelligence involves hands on and minds on. The results of this study indicate that the visual spatial intelligence of students (prior knowledge) in making the cells shape using playdough obtained the mean value 1.2 and 1.6 after learning the really cell concept. There is a change on concept understanding in making cell shape once they learn the actual cell shape with high category (5%), medium (60%), and low (35%).

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