“Geometry and Spatial Sense” by David J. Fuys and Amy K. Liebov focuses on research on the importance of geometry in the K-4 curriculum, as well as certain methods to ensure that students develop a spatial sense that will greatly help them as they move up to higher level mathematics. Geometry can also play a role in non-geometric mathematical topics, such as multiplication, fractions, probability, and more. This is why it is so important to effectively teach geometry integrated with other content area in the primary grades, so that the students can build on this knowledge to prepare them for more advanced topics, rather than simply teaching geometric shapes alone.

The goals and content for geometry in the K-4 curriculum are explained in great detail in the article. The curriculum should focus on two- and three-dimensional shapes in detail enough that students should be able to describe, model, and classify shapes. However, they should also be able to investigate and predict the results of altering these shapes. It is also important that are able to relate and connect geometry to number ideas and other mathematical practice, as well as be able to recognize geometry in the real world.

The development of spatial sense was the curriculum goal that the authors stressed the most in this article because it is a clear mandate in the Standards. There were many theories and activities outlined that would assist in developing a student’s spatial sense. Jean Piaget’s theory involved the thought that development of spatial thinking was a gradual and age-related process. The development process can start through the participation in “clinical tasks” involving the “mental representation of objects.” Some examples of this are the touch and draw/identify method, the look/trace and draw/construct method, or the look and draw a shadow.
method. In the touch and draw/identify activity, the students feel an object without being able to see it. We, as the teacher, then ask the student to either draw the object that they felt, or to identify it out of a collection of similar visible objects. In the look/trace and draw/construct activity, the students will trace a drawn figure with their finger, then they will be asked to either draw the figure on their own or to construct it with given materials. The look and draw a shadow activity would come after they have already acquired a bit a spatial sense and awareness in geometry. In this activity, the teacher will show the students how an object placed between a light and a screen will cast a shadow. Then the teacher will show the students a different shape, and the students will predict and draw what they think its shadow will look like.

According to the article, research has shown a strong connection between the use of manipulatives and better performance of spatial tasks, compared to students of “material-free schools.” Many of the activities discussed above involve some sort of manipulative, such as pattern blocks. Even just allowing “free-play” with manipulatives, such as building blocks, can develop spatial thinking because the students are using three-dimensional shapes and constructing new shapes, and they are even improving their communication skills and vocabulary because they are often doing this with another student.

Another theory discussed in the article was the van Hiele Model of Geometric Thinking, which involved levels and phases, also going along with Piaget’s research that the development of spatial sense was a gradual process. The first level is 0 at which students just visually recognize shapes by their appearance. They may know what a square looks like, but they do not know what about it makes it a square. At Level 1, students can analyze and describe shapes based on their properties. For example, a square is such because it has four equal sides and four right angles. These are the levels that K-4 curriculum involves; the rest of the levels are covered in higher grades.

In order to be sure that our students will move on to be successful in their future mathematics classes, we as teachers should focus on the causes of the low-level thinking that students have come to have when moving to higher-level topics. The article explains that there needs to be more (and higher quality) instructional time on geometry topics in general, and there needs to be more of an emphasis on the spatial level rather than the visual level in order to make this change to a higher-level of thinking.