TEACHING POLYGONS

new VOICES

JILLIAN SCAHILL

provides some teaching ideas to increase student understanding of polygons.

Teachers assume that by the end of primary school, students should know the essentials regarding shape. For example, the NSW Mathematics K–6 syllabus states by year six students should be able manipulate, classify and draw two-dimensional shapes and describe side and angle properties. The reality is, that due to the pressure for students to achieve mastery in number, teachers often spend less time teaching about the other aspects of mathematics, especially shape (Becker, 2003; Horne, 2003). Hence, there is a need to modify the focus of mathematics education to incorporate other aspects of mathematics including shape and especially polygons. The purpose of this article is to look at the teaching and learning of polygons in primary classrooms by providing some essential information about polygons and some useful teaching strategies and resources.

Some polygon facts

The following facts have been taken from websites and so are readily accessible to both teachers and students.

"The word 'polygon' derives from the Greek word 'poly', meaning 'many' and 'gonia', meaning 'angle'" (Nation Master, 2004).

"A polygon is a closed plane figure with many sides. If all sides and angles of a polygon are equal measures then the polygon is called regular"

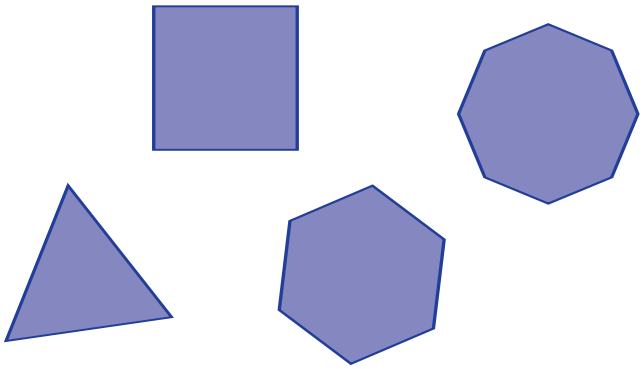

Figure 1. Examples of regular polygons.

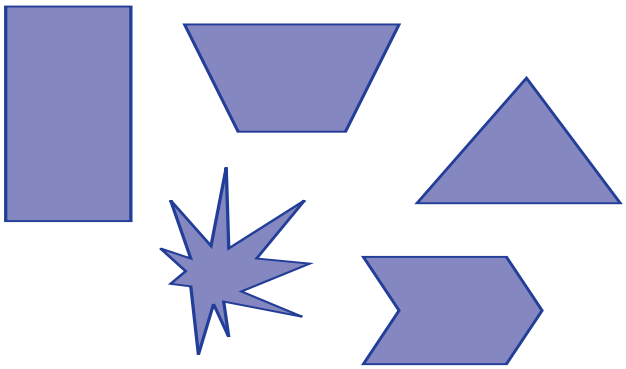

Figure 2. Examples of irregular polygons.

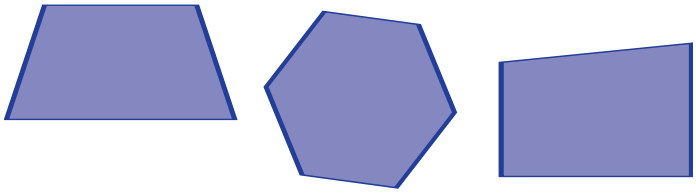

Figure 3. Examples of convex polygons.

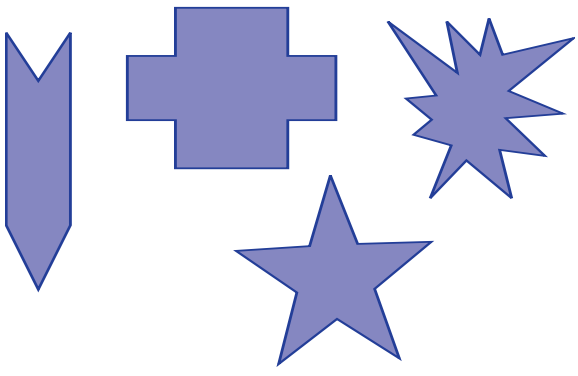

Figure 4. Examples of concave polygons.

(Weisstein, 1999); "a polygon whose sides and angles that are not of equal measures are called irregular" (Cahir, 1999).

"Polygons can be convex, concave or star" (Weisstein, 1999).

A star polygon is a figure formed by connecting straight lines at every second point out of regularly spaced points lying on a circumference. A concave polygon is a polygon that is not convex. "A polygon is concave if at least one of its internal angles is greater than 180° and it must have at least four sides" (Weisstein, 1999).

A convex polygon is a polygon that has every internal angle less then 180° and every line segment between two vertices of the polygon is strictly interior to the polygon except at its endpoints. For example every triangle is convex as none of their angles exceed 180° (Wikipedia, 2005).

Due to time constraints when teaching the properties of polygons, teachers often only teach the students about regular polygons or neat irregular polygons as these are easy to teach rather than complicated irregular polygons. "The lack of using diverse irregular polygons can restrict students' thinking and development of mathematical understanding" (Becker, 2003, p. 25). As teachers, we sometimes do not realise that we are restricting learning by not covering all aspects of regular and irregular polygons. It is important that students are taught about the properties of irregular polygons as these are the most common polygons that they will find in everyday life.

Some teaching strategies and resources

An effective way of teaching about polygons in the classroom is to develop a unit that crosses over into other Key Learning Areas. For example, an overhead projector and different colour overheads cut into polygons can be used to introduce the different types of polygons to a class and the geometry vocabulary can be covered in spelling (Houghton Mifflin School Division, 1996). Polygons can also be found in the community, and in designs and constructions (Figure 3). Greater exposure to a variety of polygons gives students a greater chance of learning the properties.

Students can take responsibility for their own learning through investigating and researching polygon properties, such as angles, side lengths, parallel sides, symmetry, tessellation and diagonals. Becker (2003) argues that allowing students to take responsibility for their own learning they are able to develop a deeper understanding of the topic. He argues that by allowing students to choose a certain property or assigning them a property of polygons they are able to gather more information about polygons than the teacher could present in a short time. A lot of content can be covered through each student reporting his/her findings to the class.

There is an abundance of resources available to teachers to assist them in teaching polygons to their class but most of these resources lay undiscovered because they are not advertised well. The Internet, for example, has many web quests that investigate polygons and the properties of polygons. Mrs Glosser's Maths Goodies web page provides an online lesson on the perimeter of polygons and provides students with some problems to solve. This web site can be found at: www.mathgoodies.com/lessons/vol1/perimeter.html.

Maths Cats is a website where students can drag different polygons around the screen to make different shapes, patterns, tessellations and explore symmetry. This web page can be found at www.mathcats.com/explore/polygons.html.

In conclusion, it is important as teachers that all aspects of mathematics education, not just number are taught. It is important that the focus changes in order for students to meet the outcomes and indicators of all the strands of mathematics. Polygons are an important part in the education of students as they teach them how to make patterns, tessellations, how to use polygons to make other shapes, build on polygons to form 3D shapes and about symmetry.

Figure 3. Tessellation of polygons in the environment.

References

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Jillian Scahill is a third year student in the Bachelor of Education course at the University of Sydney.