Conics: an epistemological and historical study about their geometrization

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1. Research issue

Conics have undergone an **algebraization** process in the school. Since the beginning of the 20th century, conics in geometry of space has been reduced to tale about **Apollonian procedure for cutting a right cone,** without any link to the algebraic approach.

We aware the **spatial reasoning** is implicated in the **science development and communication**, hence the conics are not the exception. The algebraic approach conceals the Apollonius' procedures and thinking, mostly in the **Euclidean space,** influenced by the tradition of Ancient Greece.

2. Research approach

We studied *the social construction of the conics.* Based on **Socio-epistemological Theory (ST),** we analyzed the epistemological **(ED)**, cognitive **(CD)** and social **(SD)** dimensions of the mathematical knowledge: conics.

Which **practices** accompanied and preceded the construction of conics in space geometry?

What **practices** in the space, from history, can be reconstructed for document and support an **experiment for teaching?**

3. Method

We did a historical and documental research, then we studied and analyzed the mini-treatise and propositions 11, 12, 13 and 14 of the book I of **Apollonius of Perga Conics.**

3.1. Data organization

Apollonius of Perga Conics was the primary source and **Apollonius of Perga's Conics. Text, Context, Subtext** was the secondary source and other were tertiary sources.

3.2. Data production

According to **Qualitative Content Analysis,** we find the content-analytical units (propositions), also identify verbal data (genre and subgenre), visual data (diagram) and we pose indicators from theory.

3.3. Data analysis

Practice — Why did Apollonius do?

Activity — What was Apollonius doing this for?

Action — What did Apollonius do? How did he do it?
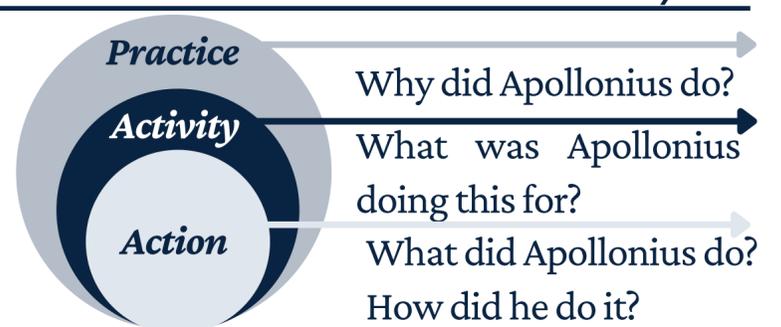
4. Results
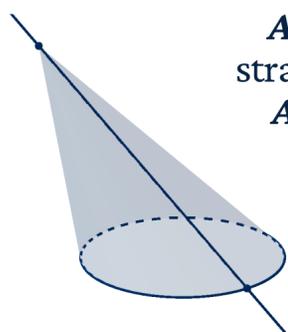
Activity: Rotation of the straight line to get the cone.
Actions: Location of the geometric objects, *mode of the movement* of the point into the circumference.
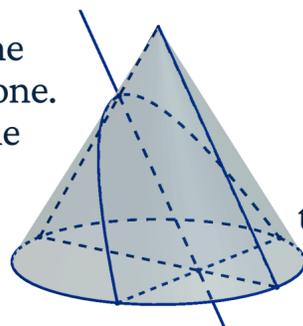
Activity: Section to get the conic.
Actions: Section to get the axial triangle, *changing of perspective.*
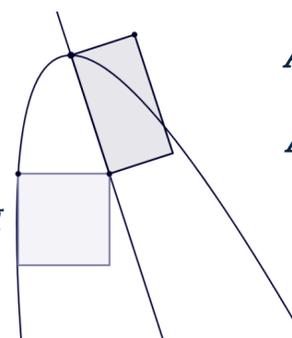
Activity: Application of areas
Actions: Section to get common sections (segments), *comparing length figure, translation.*

Rotation, section and **application of areas** are *practices,* which accompany and precede the construction of the *conics* and their main properties or *symptoms* **(ED).** *Practices* are social shared because these came from traditions and socio-cultural factors of the Ancient Greece **(SD).** The *spatial reasoning* is fundamental in the construction of conics, there are mental and physical skills, which enhance the meaning of this notions and their algebraic approach **(CD).**

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