



ASTRONOMY: THE FAIRY TALE

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Students create their own class magazine including self-written fairy tales based on great astronomical discoveries. For the visual design, students will learn how to download images of space from the LCO archive and edit them with the tool GIMP.

EDUCATIONAL CONTEXT

AGE

13-16 (depends on their knowledge of computers)

DURATION

4-5 school hours (depends on the age of the students)

PREREQUISITES

The students should be familiar with the structure of fairy tales since they will be writing their own. Basic knowledge about astronomy and informatics is helpful as the students will have to work with computers.

EDUCATIONAL OBJECTIVES

WHAT DO YOU AIM FOR YOUR STUDENTS TO LEARN THROUGH THIS ACTIVITY

COGNITIVE OBJECTIVES

Learners' ability to process information about astronomy and actively work with it.

AFFECTIVE OBJECTIVES

To have a sense of achievement by designing their own class magazine.

PSYCHOMOTOR OBJECTIVES

Using their creativity to create stories and edit images with GIMP.

CONNECTION TO THE CURRICULA

- German
- History
- Arts
- Informatics
- Scientific subjects

EDUCATIONAL APPROACH

[Inquiry based learning](#)

In the following pages there is a template based on the inquiry learning method. It is not necessary to follow this method. You can choose any approach you like.

ORIENTING & ASKING QUESTIONS

“In 1543 AD, when Copernicus became the first person to demonstrate the math behind the insane idea, that the earth moves around the sun, he was universally ridiculed. In fact, the “heliocentric model” was so revolutionary that Copernicus was actually afraid to publicize it. However, once the idea was finally accepted, it eliminated many problems with older astronomical studies and is considered the first major realization of our place in the Universe. We realized that the Sun is a star, not a God, and that we aren’t located at the center of the universe.”¹

These facts sound very interesting for adults, but students might need a different format, which gives them information in an easier, more appealing way. This is where the fairy tales come into play. What if we take the information from above and convert them into something like this?

“Once upon a time, in a faraway land, there lived a brilliant astronomer named Copernicus. He spent countless hours gazing at the stars and planets, trying to make sense of the mysteries of the universe.

One day, while studying the movements of the heavenly bodies, Copernicus had a revolutionary idea. He realized that the Earth and the other planets in our solar system revolved around the Sun, and not the other way around as people had believed for centuries.

Excited by this discovery, Copernicus eagerly shared his findings with the other scholars of his time. However, they scoffed at him and called him crazy. They couldn't believe that the Earth was not at the center of the universe, and they ridiculed Copernicus for even suggesting such an "insane" idea.

Frustrated and disheartened, Copernicus retreated to his observatory and continued his work in secret. He was afraid to share his discovery with the world, fearing that he would be persecuted for his beliefs.

Years passed, and Copernicus continued to study the heavens. He refined his theories and developed the math to support his heliocentric model. Finally, after much deliberation, he decided to share his work with the world.

To his surprise, people were finally ready to accept his groundbreaking ideas. The heliocentric model eliminated many problems with older astronomical studies and opened new possibilities for exploration and discovery.

¹ Gupta, Harsh. Most Important Astronomical Discoveries To Date. July 2022. (online: <https://www.scienceabc.com/nature/universe/important-astronomical-discoveries-universe-jupiter-relativity-expanding-galileo-copernicus-hubble-galaxy.html>)

Copernicus was hailed as a hero and his discovery is considered the first major realization of our place in the Universe. We realized that the Sun is a star, not a God, and that we aren't located at the center of the universe.

And so, Copernicus lived out the rest of his days knowing that his perseverance and determination had changed the course of history and expanded our understanding of the cosmos.”

Goals and questions from current knowledge

To start this activity, I suggest that you have an open conversation with the students to gauge their initial knowledge on this subject. Some of the questions you can ask are:

- Do you know any great astronomical discoveries?
- Do you know the story behind these discoveries?
- Have you ever used a telescope, or looked at detailed photos of planets, galaxies etc.?
- What are the characteristics of a fairy tale?
- How is a magazine structured?

The main goal is to create a complete magazine at the end of the activity, filled with easily accessible information that the students can always refer to. It would be nice to write this digitally so everyone could access it, or print it out for everyone after it's done, if that is possible.

HYPOTHESIS GENERATION AND DESIGN

After the starting conversation, continue with presenting a few great astronomical discoveries by showing a quick video or projecting an internet site to the students.

Thereon, the students can work in pairs, in (not too big) groups or alone. They should decide on one discovery that they find most interesting and search for pictures of it in the LCO archive.

The Las Cumbres Observatory provides twenty-five telescopes at seven sites around the world to observe the night sky in real-life time. However, in this activity, we will be using the archive, which consists of photos that have already been taken by the telescopes before.

Let's give an example:




The students decided on the Orion Nebula (M42).

So, they search for images on the LCO archive, find the best suitable pictures and download them to their computers.

Observatory

The design and implementation of the LCO Network is aimed at providing capabilities uniquely suited for astronomical time domain studies. The telescopes of a given aperture and their instruments are identical and state-of-the-art.

The scheduler automatically adjusts schedules of individual telescopes continuously as needed. Monitoring observations can be passed off from site to site, and observations can be interrupted for targets of opportunity very quickly.

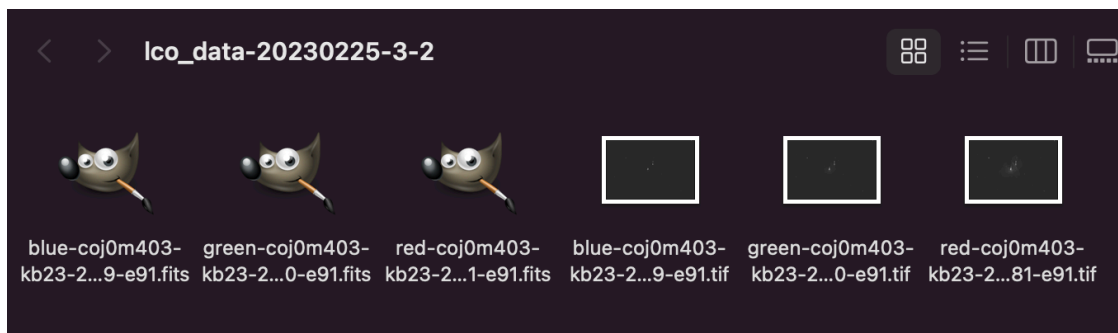
ARCHIVE	DOCUMENTATION	INSTRUMENTS
 LCO image data archive including raw and reduced frames.	 Descriptions of the archive and data pipeline, "Getting Started" guides for new users, etc.	 About our science imagers, spectrographs and filter sets.

It is very important that they download the BANZAI uncompressed “fits” files so that easy working with GIMP can be assured.

They download three different pictures, one with green (V filter), one with blue (B filter) and one with red (R filter) tones.

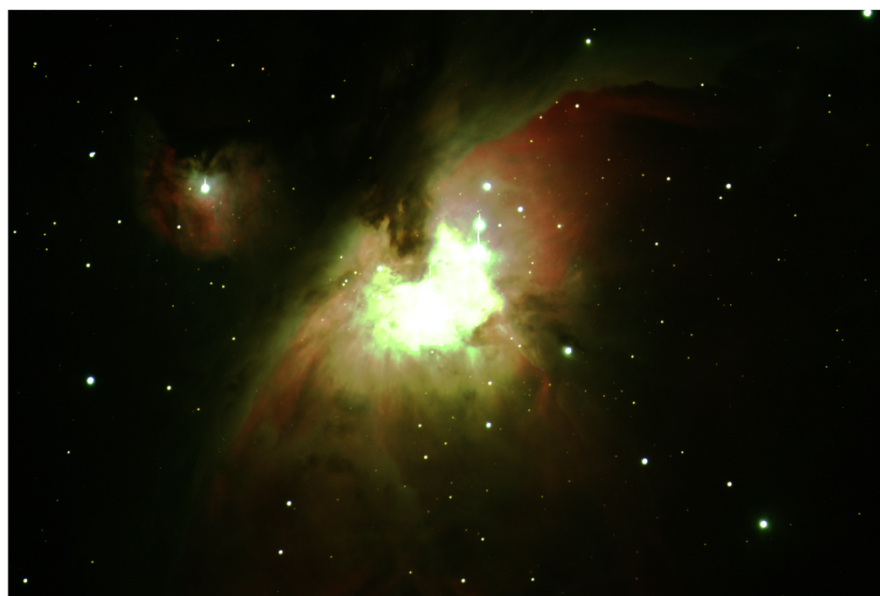
	Time	Proposal	Object	Filter	Type	Exp. Time	R. level
<input type="radio"/> zip download (with compressed fits files)	2023-02-19 10:45:11	FTPEPO2014A-004	orion nebula	rp	EXPOSE	60.2	BANZAI
<input checked="" type="radio"/> zip download (with uncompressed fits files)	2023-02-19 10:45:11	FTPEPO2014A-004	orion nebula	rp	EXPOSE	60.2	Raw
<input type="radio"/> wget script	2023-02-19 10:43:52	FTPEPO2014A-004	orion nebula	V	EXPOSE	60.2	BANZAI
<input type="radio"/> wget script	2023-02-19 10:43:52	FTPEPO2014A-004	orion nebula	V	EXPOSE	60.2	Raw
<input checked="" type="checkbox"/> coj0m403-kb23-20230219-0079-e91	2023-02-19 10:42:32	FTPEPO2014A-004	orion nebula	B	EXPOSE	60.2	BANZAI
<input type="checkbox"/> coj0m403-kb23-20230219-0079-e00	2023-02-19 10:42:32	FTPEPO2014A-004	orion nebula	B	EXPOSE	60.2	Raw

After the successful download, they need to convert the “fits” files into “tifs” which can be handled by a fits viewer or any online converter. This is essential to adjust the grey scale to see the images properly.



Now they can open GIMP and paste the three pictures into the application to edit them.

If they work properly, they should be able to have one colorful picture of their chosen discovery at the end.



PLANNING AND INVESTIGATION

In the following step, the students research about their discovery on the internet. It is helpful to give the students a few reliable sites where they can take their information from, so false information can be prevented.

Afterwards, the learners will use the information they could get and convert these into thrilling fairy tales. They can also be inspired by their edited pictures to let their own creative ideas mix with the facts. It is useful to give the students one or two examples of such fairy tales as seen above.

ANALYSIS & INTERPRETATION

While working with LCO and GIMP, did you face any problems? What did you do to solve them? Was it simple to find pictures of your discovery?

How was the process of researching facts and writing the fairy tale(s)? Did you find ideas easily?

How was the division of work? Did everyone have a different task, or did you work together on everything?

Reflect on these questions and discuss them with your colleagues.

CONCLUSION & EVALUATION

The concluding task is to put the stories and the pictures together, write the names of the authors on it and collect them all in one document which then can be printed out or sent virtually.

To sum the activity up, the students can take turns presenting their fairy tales to the classroom and talk about the process.