

INITIATING PBL1: *Design a Space Alien* – In preparation for the mission to your local Challenger Learning Center, your students will progress through two PBL activities. The first is titled *Design a Space Alien*. The second is *Rendezvous with a Comet*. PBL1 introduces students to the PBL experience using a familiar theme – animal adaptations.

Once students have learned how to conduct a PLB based on a familiar topic, they will begin work on PLB2, *Rendezvous with a Comet* in preparation for their mission at your local Challenger Learning Center. The tasks associated with PBL2 are considerably more complex than those associated with PBL1. It is therefore essential that PBL1 not be skipped; it is the training ground for PBL2.

- **Introduce Problem Statement**

Introduce students to the problem statement through the WebQuest site. The PBL1 *Design a Space Alien* website can be found at the following address:

<http://www.phy.ilstu.edu/~wenning/clcrendezvoustg/students/webquest1/>

Introduce students to the website and help them to move through the pages sequentially, being certain that they understand the content of each page before they progress to the next. It might be best at this point for the teacher to demonstrate the website with the use of a video projector attached to a computer rather than having each student sit down at his or her own computer. Do this first time as an overview. The WebQuest will be visited time and again later as students need to identify specific requirements.

- **Present scoring rubrics**

Students need to understand what is expected of them. Scoring rubrics are an excellent way of making expectations known. Talk about the nature of a scoring rubric and how they will be used. Explain that both teacher and students will be using scoring rubrics to assess to performance of individual team members and other teams.

- **Conduct climate setting**

Point out to your students that the PBL approach is probably very different from anything they have encountered in a classroom before. They will not be treated like empty vessels to be filled with knowledge; they will be treated as active inquirers attempting to solve a complex, real-world problem that probably has no “right” or “wrong” answer.

- **Explain the rules of social engagement**

Indicate that we will be using a cooperative learning style where everyone is expected to contribute to the best of their ability. Point out that cooperative learning implies that everyone must work together following certain rules of conduct. No one wants to have to

do all the work while others contribute nothing. It's a matter of fairness that everyone contributes meaningfully to solving the problems that they will be asked to address.

- **Establish small cooperative groups**

There should be eight (or nine if the class has more than 32 students) work groups if at all possible to ensure compatibility with staffing needs of the mission at your local Challenger Learning Center. There should be heterogeneity within groups and homogeneity among groups. Girls generally should be put into groups in pairs if possible. Each group should have a heterogeneous composition by ability. That is, each group should contain a representative number of students with high and low ability. In this way, all groups will be essentially the same in terms of overall academic ability.

- **Establish roles within teams**

It is often best to establish specific roles within cooperative student groupings. These roles can and probably should change on a daily basis. Consider appointing a questioner, a scribe, a critic, and so on. Explain the work of each role.

- **Assign planets or a moon to student teams**

Revisit the PBL1 WebQuest site. Randomly assign students to various planets or moon. If you prefer, have the students choose from among these locations. Here are the various locations:

Mercury
Venus
Mars
Jupiter
Saturn
Uranus
Neptune
Titan (a moon of Saturn)

Sorry, Pluto is no longer considered a planet. It demoted to dwarf planet status on August 24, 2006, by the International Astronomical Union.

- **Re-state goal or pivotal question**

It's a good idea to re-state the problem from time to time using simple language.

- **Help students identify what is known, what needs to be known, and how to find out**

Start with a whole group process asking what's known, what do we need to know, and how will we find out?" In PBL1 *Design a Space Alien* for instance, focus on what the goal is, what the meaning of adaptation is, what senses are, and what written and oral reports must include. Later, each of these questions should be addressed by each team as part of their written and oral reports. Do not provide your students with these questions; rather, get them to think about what needs to be known, and solicit their responses until such questions are identified. You might start with basic questions such as who, what, when, where, why, how and so on. Later, address the question about how teams might find answers to their questions. Return to the WebQuest as necessary to find online resources; other non-computer-based resources can also be identified and used. Student teams can record their data on the *Know Need to Know* form.

- **Begin the mentoring process**

Once students understand what is known, what needs to be known, and how to find out, they begin a small group effort to solve the problem at hand and prepare the required student performance assessments. At this point they cooperatively use available resources to answer identified questions. Keep in mind that cooperative learning does NOT imply that everyone has to be doing exactly the same thing all the time. Teams will frequently use a "jigsaw" approach in which they take the larger problem, break it down on smaller components, and then have team members work on that smaller component. They then reassemble the pieces like a jigsaw puzzle to bring the solution together.

- **Students complete products**

Only after students have become well versed in the content of their project do they begin assembling the final written report. Later, after the written report is finished, they move on to preparing the oral report. Students should be directed to the guidelines for preparing the written report and the oral presentation.

- **Student pre-assessment of products**

Student should be asked to self-assess the quality of their products before they turn them in or present them for scoring. They can either be referred to the guidelines found on the WebQuest, or to the detailed scoring rubric used by the teacher.

- **Student presentation of products**

Students complete and hand in the written report by a specified date. The teacher then assesses each written report for content and style using the two detailed scoring rubrics found below. Following this submission, students begin preparing for the oral report. They should receive a score on the written report in order to allow them to further improve their oral report. Teachers should be certain to limit the size of the written report and the duration of the oral report in advance of students completing the work.

- **Teacher and student assessments**

Scoring of students' written and presentation work is conducted by the teacher using the appropriate scoring rubric. Students score presentations and team members using the appropriate scoring rubrics.

- **Team processing**

Students undoubtedly have learned something about working in small groups. Many times they learn how such groups should NOT function. Allow time for students to self-assess team performance. This will help build cooperative learning skills, and will improve performance in the future. Such learning will be critical for completing PBL2 *Rendezvous with a Comet*.