THE HERA MISSION: MEETING DISCOVERY CLASS MISSION PRECEDENTS FOR EDUCATION AND PUBLIC OUTREACH. S. Bassett[1,2], D. W. G. Sears[1], [1]Arkansas-Oklahoma Center for Space and Planetary Sciences, University of Arkansas, Fayetteville, AR 72701, USA, [2] Lincoln High School, Lincoln, AR 72744.

Introduction: Education and Public Outreach (EPO) are increasingly important aspects of NASA goals. For instance, the NASA Office of Space Science requires every flight project proposal to devote 1-2% of the overall mission budget toward EPO.

The Hera mission is a proposed Discovery class mission that will visit a near-earth asteroid and return asteroid samples to Earth. This mission will generate unprecedented information about the early solar system, the formation of the planets, and the connection between stars and our Sun. The requirements for planetary protection are particularly restrictive, and a high level of risk communication and public trust is necessary to ensure support for the mission. Therefore, EPO for asteroid or comet return missions such as Hera is critical [1].

A goal of the Hera mission is to draw from the EPO precedents set by previous and ongoing missions in the development and implementation of a high-quality, effective EPO effort. This study will result in a qualitative database and a descriptive summary of EPO activities of the Hera mission and existing NASA Discovery class missions. The results will provide an overview of the diverse EPO undertakings of Discovery class missions that can be used by the Hera team in planning EPO activities.

Education and Public Outreach (EPO): The roles of scientists in EPO are varied and diverse, as are the audiences which are targeted. Audiences for EPO include K-12 students, classroom teachers, and the general public. The continuum of activity in "Scientific Communication" has been differentiated by audience, contact time, and level of understanding attained by audience. Certain activities are excluded from EPO, such as marketing activities (e.g. posters, brochures) and news media support (e.g. press releases, interviews). EPO activities can be categorized according to the representation in Figure 1, which is adapted from a framework created by C.A. Morrow [2].

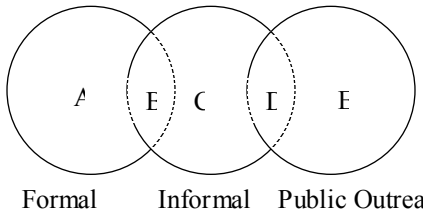

Figure 1. Conceptual Framework of Education and Public Outreach.

Activities categorized as Formal Education, shown in Region A of Figure 1, typically take place in a classroom settings. Examples of Formal education include classroom visits, teacher training, and curriculum materials. Formal Education activities typically have a direct and focused impact on a small audience for a longer duration of time, and generally elicit a deeper level of understanding. Informal Education activities, shown in Region C, typically take place in a unique setting, such as a museum or planetarium. Examples of Informal Education include museum exhibits, star parties, and field trips. The activities of Public Outreach, shown in Region E, are designed to reach a wide audience for a smaller period of time. These activities generally take place while the audience is at home, and elicit a shallower level of understanding than Formal and Informal Education. Examples of Public Outreach include educational TV programs, magazine articles, popular books, and webchats. The two areas of overlap in Figure 1 represent EPO activities that fall in between two categories, shown in Regions B and D. These regions involve linkages between the other adjacent areas. Activities in Region B, Formal/Informal Education, typically take place in a unique setting, yet have more structured educational impact than Region C. For example, educational activities that are done in collaboration with a community youth group would fall in Region B. Activities in Region D, Informal Education/Public Outreach, take place in a unique setting like Informal Education, yet retain elements of passive entertainment like Public Outreach. Activities such as lectures and planetarium shows would fall in Region D.

A comprehensive EPO plan addresses all five areas diagrammed in Figure 1, from Formal

Education to Public Outreach [2]. Because there is a trade-off between the numbers of people reached and the impact of science understanding, it is necessary for the Hera mission to consider the distribution of its EPO activities to ensure that a balance of focus is attained. Furthermore, NASA Office of Space Science has placed special strategic emphasis on K-12 education in response to nationwide education reform efforts. This emphasis on Formal Education audiences should be reflected in the Hera EPO proposal.

Methods: In this study, "activity" is defined as a product or service related to Education and Public Outreach, such as a printed product, museum exhibit, teacher training session, or student workshop. Information about the Discovery class mission is collected from annual reports published by NASA Office of Space Science Education and Public Outreach in the years 2000 [3], 2001 [4], and 2002 [5]. The methodology of this study involves categorizing EPO activities according the framework in Figure 1. Activities are classified into the following categories: A: Formal Education, B: Formal/Informal Education, C: Informal Education, D: Informal Education/Public Outreach, and E: Public Outreach. If an activity listed in the annual reports cannot be classified into these categories, such as a press release, then it is omitted. Hera E/PO activities are similarly classified. The results are compared in terms of descriptive characteristics as well as overall trends.

Results and Recommendations: Data was compiled for Discovery class missions using the annual reports. A complete descriptive database of each mission's activities was developed, including activity category, name, description of activity, and year(s). The results showed that EPO activities frequently involved collaboration with other missions. All five categories were well represented by Discovery class mission EPO activities. Additionally, EPO contacts were identified for each mission for future communication and collaboration purposes.

Overall descriptive statistics were compiled on the number of activities for each mission, which are summarized in Figure 2. Six of the eight Discovery class missions studied had greater than 50% of EPO activities in the A category, which represents Formal Education. This indicates a focus on the left side of the EPO continuum, toward small audiences with deeper understanding. For the Hera mission, 36% (4 of 11) of the proposed activities fell under the Formal Education category. This may indicate the need for an increased emphasis in the Hera proposal on Formal Education.

Secondly, the Hera proposal includes 11 activities, whereas the average number of activities was 20 for the other missions. While the number of activities is not necessarily an indication of the effectiveness or quality of EPO efforts, this may be an indication that further activities should be considered, either at the current proposal stage or in the future.

References: [1] Lindstrom M.M. (2000) The importance of education, public outreach, and risk communication in asteroid or comet sample return missions. NASA Johnson Space Center, Houston, TX. Near-Earth Sample Return Workshop. [2] Morrow, C.A. (2000) Excerpt from: "A framework for planning education and public outreach programs associated with scientific research programs." Space Science Institute, Boulder, CO. [3] Sakimoto, P. (Ed.) (2001) Education and Public Outreach Annual Report FY 2000. NASA Office of Space Science. [4] Sakimoto P. (Ed.) (2002). Education and Public Outreach Annual Report FY 2001. NASA Office of Space Science. [5] Sakimoto P. (Ed.) (2003). Education and Public Outreach Annual Report FY 2002. NASA Office of Space Science.

	A	%	B	%	C	%	D	%	E	%	Total Activities
Deep Impact	18	55%	5	15%	5	15%	1	3%	4	12%	**33**
Dawn	1	50%	1	50%	0	0%	0	0%	0	0%	**2**
Genesis	20	71%	4	14%	2	7%	1	4%	1	4%	**28**
MESSENGER	9	64%	1	7%	3	21%	1	7%	0	0%	**14**
NEAR	10	32%	3	10%	10	32%	6	19%	2	6%	**31**
Stardust	15	56%	4	15%	5	19%	0	0%	3	11%	**27**
CONTOUR	8	47%	2	12%	5	29%	1	6%	1	6%	**17**
Lunar Prospector	3	50%	1	17%	2	33%	0	0%	0	0%	**6**
Average	***10***	***53%***	***3***	***17%***	***4***	***20%***	***1***	***5%***	***1***	***5%***	***20***
Hera	4	36%	2	18%	2	18%	1	9%	2	18%	**11**

Figure 2. Summary of E/PO activities by mission. A: Formal Education, B: Formal/Informal Education, C: Informal Education, D: Informal Education/ Public Outreach, E: Public Outreach