A Review of Research on Project-Based Learning by John W. Thomas

The five criteria are centrality, driving question, constructive investigations, autonomy, and realism.

1. *PBL projects are central, not peripheral to the curriculum*. This criterion has two corollaries. First, according to this defined feature, projects are the curriculum. In PBL, the project is the central teaching strategy; students encounter and learn the central concepts of the discipline via the project. There are instances where project work follows traditional instruction in such a way that the project serves to provide illustrations, examples, additional practice, or practical applications for material taught initially by other means. However, these "application" projects are not considered to be instances of PBL, according to this criterion. Second, the centrality criterion means that projects in which students learn things that are outside the curriculum ("enrichment" projects) are also not examples of PBL, no matter how appealing or engaging.
2. *PBL projects are focused on questions or problems that "drive" students to encounter (and struggle with) the central concepts and principles of a discipline*. This criterion is a subtle one. The definition of the project (for students) must "be crafted in order to make a connection between activities and the underlying conceptual knowledge that one might hope to foster." (Barron, Schwartz, Vye, Moore, Petrosino, Zech, Bransford, & The Cognition and Technology Group at Vanderbilt, 1998, p. 274). This is usually done with a "driving question" (Blumenfeld et al., 1991) or an ill-defined problem (Stepien and Gallagher, 1993). PBL projects may be built around thematic units or the intersection of topics from two or more disciplines, but that is not sufficient to define a project. The questions that students pursue, as well as the activities, products, and performances that occupy their time, must be "orchestrated in the service of an important intellectual purpose" (Blumenfeld et al., 1991).
3. *Projects involve students in a constructive investigation.* An investigation is a goal-directed process that involves inquiry, knowledge building, and resolution. Investigations may be design, decision-making, problem-finding, problem-solving, discovery, or model-building processes. But, in order to be considered as a PBL project, the central activities of the project must involve the transformation and construction of knowledge (by definition: new understandings, new skills) on the part of students (Bereiter & Scardamalia, 1999). If the central activities of the project represent no difficulty to the student or can be carried out with the application of already-learned information or skills, the project is an exercise, not a PBL project. This criterion means that straightforward service projects such as planting a garden or cleaning a stream bed are projects, but may not be PBL projects.
4. *Projects are student-driven to some significant degree*. PBL projects are not, in the main, teacher-led, scripted, or packaged. Laboratory exercises and instructional booklets are not examples of PBL, even if they are problem-focused and central to the curriculum. PBL projects do not end up at a predetermined outcome or take predetermined paths. PBL projects incorporate a good deal more student autonomy, choice, unsupervised work time, and responsibility than traditional instruction and traditional projects.
5. *Projects are realistic, not school-like*. Projects embody characteristics that give them a feeling of authenticity to students. These characteristics can include the topic, the tasks, the roles that students play, the context within which the work of the project is carried out, the collaborators who work with students on the project, the products that are produced, the audience for the project's products, or the criteria by which the products or performances are judged. Gordon (1998) makes the distinction between academic challenges, scenario challenges, and real-life challenges. PBL incorporates real-life challenges where the focus is on authentic (not simulated) problems or questions and where solutions have the potential to be implemented.