

**Title:** Collaborative and Self-Directed Learning Processes: A Case Study in Malaysian Chemistry PBL Lesson

**Author/Authors:** Tan Yin Peen, Mohammad Yusof Arshad

**Abstract:** Problem-based learning (PBL) provides students with the opportunity to conduct self-directed learning in collaborative groups, which are essential skills to meet challenges in the 21st century. This study aims to investigate the occurrence and types of collaborative and self-directed processes during problem analysis phase utilizing the FILA-MMS chart in Malaysia secondary school. Two out of five groups of students taught by a teacher in one PBL chemistry lesson was observed, audio-recorded and the verbatim were analyzed. The findings show that collaborative process and self-directed process occur in both groups. Collaborative processes occur by 79.1% and 78.9% in group 1 and group 2 respectively. Major collaborative processes observed in both groups are 'question and answer', 'co-construction' and 'sharing of ideas or information'. Self-directed processes occur by 18.3% and 12.9%. The main self-directed processes observed are 'monitoring' and 'directing'. This study shows that there is a lack of selfdirected learning skills among students, such as planning, reflection, evaluation of understanding, and managing information and resources. To enhance these skills among students, future PBL teachers are suggested to emphasize and model planning, reflection and evaluation processes in their lessons.