Problem Solving and Independent Learning: Principles & Practices

Principles Which Drive

We use Problem Solving and Independent Learning because they:

- Build transferrable skills and attributes which are useful in school and beyond
- Test capacity to learn in contexts which are more challenging than prescriptive activities
- Develop cognitive flexibility
- Give students a central role in improving their own learning, decision-making and capacity to sustain involvement
- Provide substantial whole school opportunities to vary the duration, context, purpose and authenticity of learning
- Reinforce the true worth of learning

Practices Which Impact

We use a variety of effective methods:

School Led

- Project-Based Learning
  Project Based Learning involves students working in groups alongside adults to answer an essential question and to exhibit their answers in the form of a carefully crafted product. The product can be an artefact, a set of recommendations, a portfolio, a performance, a publication or an event. There are three dimensions to Project Based Learning: Exhibition, Multiple Drafts and Critique. For a full explanation of the approach see Work that Matters: The Teachers Guide to Project Based Learning

- Enquiry Based Learning
  Enquiry Based Learning starts from a big question. A big question might be why is the sky blue? Or, are we naturally competitive? Or why do humans laugh? Time is spent researching the question and formulating possible answers before presenting those answers to an interested audience. The best Enquiry Based Learning projects have an authentic purpose. This may be in
the from a problem which needs solving or it may be that there is a presentation to be made to an outside group. Typically students would collaborate in mixed age groups and spend several days working through the enquiry.

- **Thematic approaches**
  Many schools take the opportunity of the early secondary years to develop cross-curricular approaches to learning. In many cases these approaches cohere around themes and as such allow students to gain fresh insights as to the nature and application of knowledge.

- **Interest Guilds**
  Some UK schools have organized students according to shared interests rather than age or stage. These interest groups or guilds can then harness shared enthusiasms to pursue deeper learning within the preferred domain. Examples might include performing arts, astronomy and outer space, living things, extreme sports, film making.

- **Knowledge, Skills and Attributes**
  Identify as a school the knowledge, skills and attributes that a student needs to be a great independent learner. Display and share these features and look to explicitly, teach model and reinforce these across the school building them into rewards, assessment and reporting.

- **Practising Independence and Problem Solving**
  As students progress through the year and through the school, build in opportunities both within and outside the formal curriculum to practice their independent learning skills in increasingly challenging, lengthy and autonomous enquiry and problem solving tasks.

- **Problem Solving Strategies and Tools**
  Develop and agree as a school, the process the students go through when they are researching a problem, the thinking tools they could use, the questions they need to ask themselves and the steps they need to go through when coming up with their own solutions to problems. Develop, model, display and use a school thinking tool such as an Enquiry or Problem Solving Wheel or Cycle

**Teacher Led**

- **Lesson design**
  Use problem solving to shape the basic design of lessons. Rather than give information to be learned, rehearsed and eventually regurgitated - pose problems to be solved. Many teachers put students into the position of problem solving teams who are asked to examine an issue, question or phenomenon. They then undertake research, generate solutions, test and refine the solutions and then share their findings. At a more modest level, it might be that posing a question or sharing a problem is more effective in
securing learning than a teacher demonstration followed by practice exercises.

- **Success Mats**
Agree Learning Protocols with students that can be displayed and Success Mats that can be used in the classroom to reinforce key features of independent learning and problem solving such as:

- Great Questioning
- Great Paired Work
- Great Group Work
- Assessing my own Work
- Assessing Others Work
- Giving Feedback to Others for Improvement
- Reviewing my Learning
- Improving my own work
- Research and Enquiry
- Solving Problems

- **Thinking Toolkit**
Develop, model and display a toolkit in your classroom, perhaps as part of a Learning Wall, of great thinking tools to help students to process and research problems eg. Flow Charts, Venn Diagrams, Comparison Grids, Circle Charts.

- **Variety of Groupings**
Get students used to working in different pairings and groupings in the classroom on problem solving tasks eg. Home Groups and Away Groups. One great way to do this easily is to develop grouping cards that might have pictures of the students with information about working level and target grade but also has key symbols that could be used for different types of grouping – “Can all the circles get together of this table.”

**Student Led**

- **Improving own Learning**
Encourage students to model the processes of improvement in the classroom through, for example, drafting and also encourage them to generate resources, podcasts and video tutorials for other students to support improvement and independent learning.

- **Student Lead Learners**
Involve students in the processes of independent learning such as questioning, research, problem solving, review, feedback and improvement by identifying Lead Learners in these areas who can identify, draw attention to and help de-brief great practice in classroom. Student Lead Learners can also be involved in in reviewing units of work and assessment tasks with staff as well as developing problem solving and enquiry tasks.
- **Marvellous Metacognition**
  Structure regular opportunities in class to think through and talk about their thinking processes when coming up with their own solutions to subject specific problems. Encourage the students to use a Reflective Learning Log to help structure this thinking and collect ideas. This Log can be used for drafting of work and also has copies of various relevant thinking tools that can be used to help scaffold thinking.

**Peer Led**

- **Terrific Teamwork**
  Work with students on the skills, qualities, roles and questioning skills required to be an effective team member and sell the benefits to them of working in this way to solve problems and improve their own learning. Develop with them a display for the classroom “We work effectively as a team when we........” Give students regular problem challenges that allow them to use their team work skills. Get them to highlight, model and de-brief great practice.

- **Step by Step**
  Get students to talk through the steps they take in problem solving. For example each member of a pair prepares a solution to a separate question or problem, then having developed “expertise,” swaps the question not the solution. After a period of time that is not quite long enough to work out a full response, the partners guide each other through their solutions.

- **Group Drafting**
  Students work in a small group and are asked to bullet point an answer with only a pre-determined number of points, say five. They write them on a card. The cards are then passed round, swapped and then discussed. Alternatively they are stuck to a wall or other surface and then compared and questions are asked of each team member’s response.

**Parent Led – Suggestion**

- **Independent Learning Skills are important**
  Encourage parents with a range of different of jobs to talk about the skills and qualities that are required to do their jobs well and are very much looked for in job applications and interviews. Collect these responses and use them to sell the benefits to students and other parents of focusing on developing independent learning skills in school as well as academic content. Some schools have used a meeting to do this with parents speaking about their jobs and the importance of independent learning skills and qualities alongside academic qualifications.