

STEPWISE

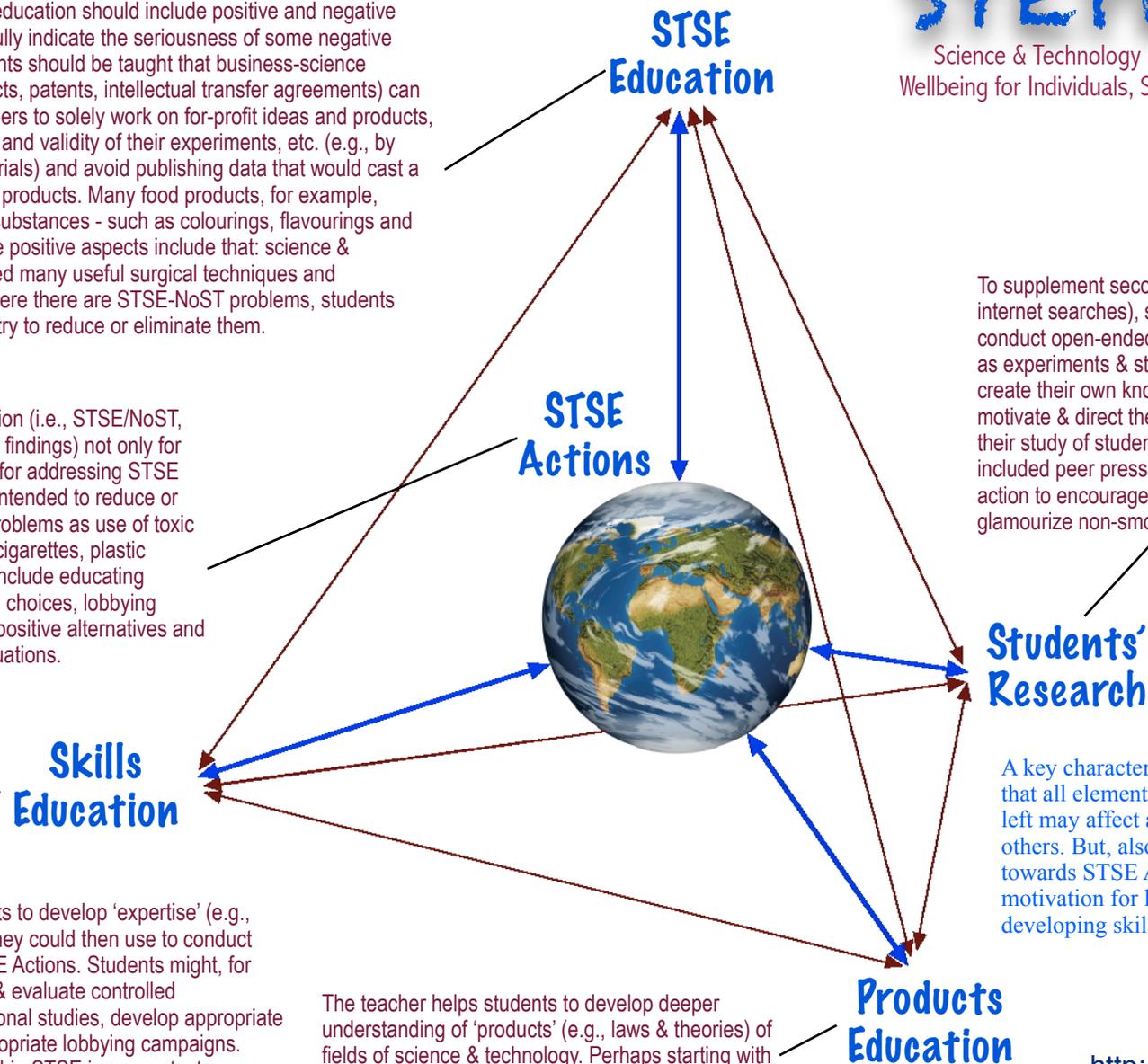
Science & Technology Education Promoting Wellbeing for Individuals, Societies & Environments

The teacher helps students to develop more realistic conceptions about relationships among fields of science & technology and societies & environments (STSE) - which would include the nature of science & technology (NoST). This education should include positive and negative aspects, but should carefully indicate the seriousness of some negative ones. For example, students should be taught that business-science partnerships (e.g., contracts, patents, intellectual transfer agreements) can lead scientists and engineers to solely work on for-profit ideas and products, compromise the reliability and validity of their experiments, etc. (e.g., by reducing the numbers of trials) and avoid publishing data that would cast a negative light on for-profit products. Many food products, for example, contain possibly harmful substances - such as colourings, flavourings and preservatives. Some more positive aspects include that: science & technology have developed many useful surgical techniques and instruments. However, where there are STSE-NoST problems, students should be encouraged to try to reduce or eliminate them.

Students use their education (i.e., STSE/NoST, Skills, Concepts & Project findings) not only for their own benefit but also for addressing STSE issues. Such actions are intended to reduce or eliminate such possible problems as use of toxic chemicals in toys, foods, cigarettes, plastic bottles, etc. Actions may include educating others, changing personal choices, lobbying power-brokers, inventing positive alternatives and disrupting STSE issue situations.

The teacher helps students to develop 'expertise' (e.g., skills & confidence) that they could then use to conduct Students' Projects & STSE Actions. Students might, for instance, learn to design & evaluate controlled experiments and correlational studies, develop appropriate graphs, and conduct appropriate lobbying campaigns. Lessons should be set within STSE issue contexts; e.g., learning to design experiments that test effects of acid rain, road salt, etc. on plant seedling growth.

The teacher helps students to develop deeper understanding of 'products' (e.g., laws & theories) of fields of science & technology. Perhaps starting with an STSE issue context (e.g., issues about 'energy' drinks), students would then be motivated to learn about bacterial action in tooth decay.



To supplement secondary research (e.g., internet searches), students design & conduct open-ended science inquiries - such as experiments & studies - enabling them to create their own knowledge. Findings can motivate & direct their STSE Actions; e.g., if their study of students' reasons for smoking included peer pressure, they could take action to encourage esteemed peers to glamorize non-smoking activities.

A key characteristic of STEPWISE is that all elements in the framework at left may affect and be affected by all others. But, also, orienting all learning towards STSE Actions gives students motivation for learning knowledge and developing skills and attitudes.

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