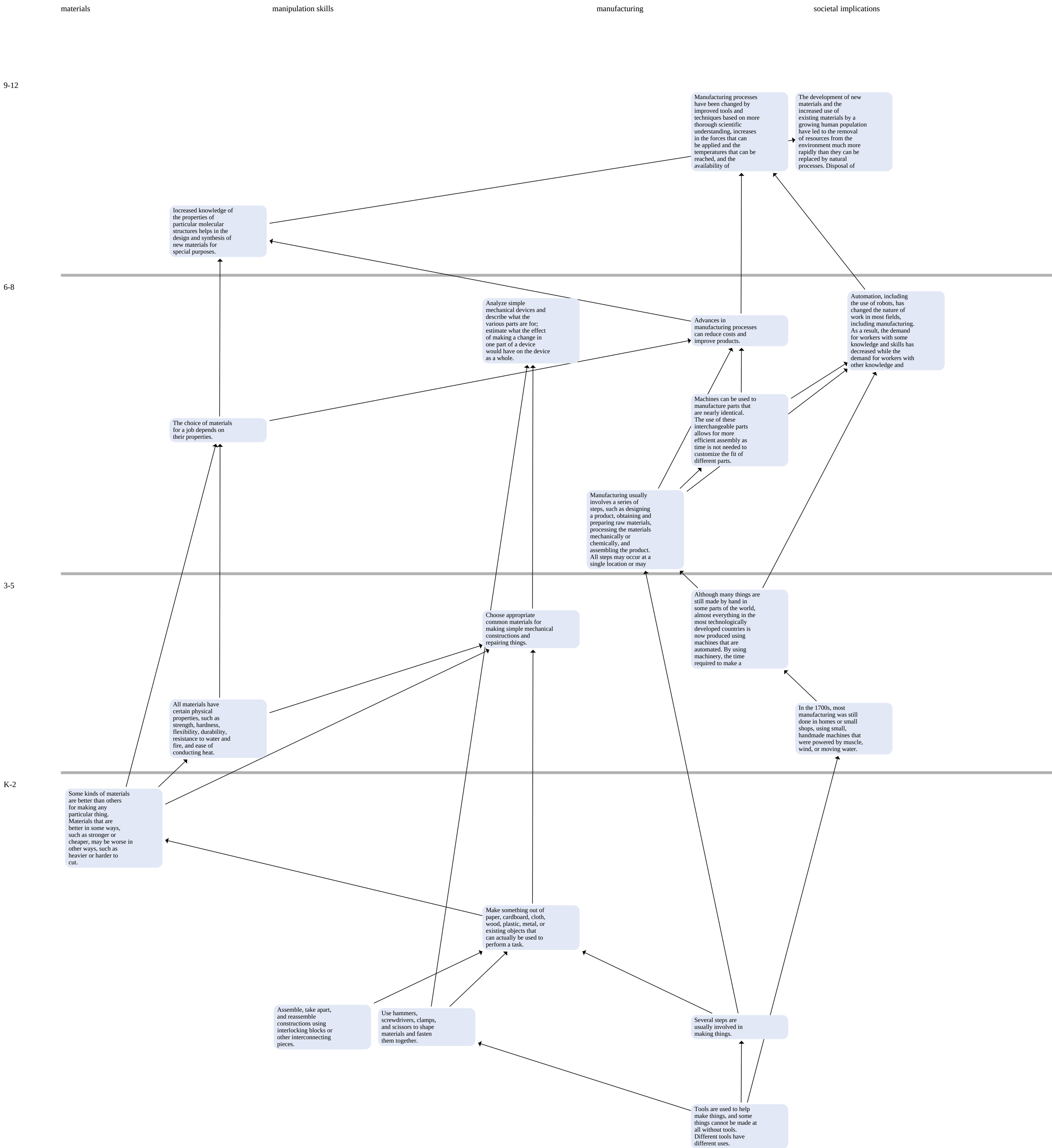
materials
manipulation skills
manufacturing
societal implications
9-12
6-8
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K-2
Manufacturing processes have been changed by improved tools and techniques based on more thorough scientific understanding, increases in the forces that can be applied and the temperatures that can be reached, and the availability of
The development of new materials and the increased use of existing materials by a growing human population have led to the removal of resources from the environment much more rapidly than they can be replaced by natural processes. Disposal of
Increased knowledge of the properties of particular molecular structures helps in the design and synthesis of new materials for special purposes.
Analyze simple mechanical devices and describe what the various parts are for; estimate what the effect of making a change in one part of a device would have on the device as a whole.
Advances in manufacturing processes can reduce costs and improve products.
Automation, including the use of robots, has changed the nature of work in most fields, including manufacturing. As a result, the demand for workers with some knowledge and skills has decreased while the demand for workers with other knowledge and
The choice of materials for a job depends on their properties.
Machines can be used to manufacture parts that are nearly identical. The use of these interchangeable parts allows for more efficient assembly as time is not needed to customize the fit of different parts.
Manufacturing usually involves a series of steps, such as designing a product, obtaining and preparing raw materials, processing the materials mechanically or chemically, and assembling the product. All steps may occur at a single location or may
Although many things are still made by hand in some parts of the world, almost everything in the most technologically developed countries is now produced using machines that are automated. By using machinery, the time required to make a
Choose appropriate common materials for making simple mechanical constructions and repairing things.
All materials have certain physical properties, such as strength, hardness, flexibility, durability, resistance to water and fire, and ease of conducting heat.
In the 1700s, most manufacturing was still done in homes or small shops, using small, handmade machines that were powered by muscle, wind, or moving water.
Some kinds of materials are better than others for making any particular thing. Materials that are better in some ways, such as stronger or cheaper, may be worse in other ways, such as heavier or harder to cut.
Make something out of paper, cardboard, cloth, wood, plastic, metal, or existing objects that can actually be used to perform a task.
Assemble, take apart, and reassemble constructions using interlocking blocks or other interconnecting pieces.
Use hammers, screwdrivers, clamps, and scissors to shape materials and fasten them together.
Several steps are usually involved in making things.
Tools are used to help make things, and some things cannot be made at all without tools. Different tools have different uses.