

MARINHA DO BRASIL
DIRETORIA DE ENSINO DA MARINHA

*(CONCURSO PÚBLICO PARA INGRESSO NO
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**NÃO ESTÁ AUTORIZADA A UTILIZAÇÃO
DE MATERIAL EXTRA**

TRADUÇÃO DE TEXTO EM INGLÊS

TEXTO EM INGLÊS PARA TRADUÇÃO

Leia e traduza para o português o texto abaixo.

"Engineering design thinking is a topic of interest to STEM [Science, Technology, Engineering, and Mathematics] practitioners and researchers alike. Engineering design thinking is "a complex cognitive process" including divergence - convergence, a systems perspective, ambiguity, and collaboration. Design is often complex, involving multiple levels of interacting components within a system that may be nested within or connected to other systems. Systems thinking is an essential facet of engineering design cognition. [...]

Engineering design is a process that has no agreed upon definition. Nevertheless, there are multiple [primary and secondary education] programs and curricula that purport to teach engineering design. Although the design definitions vary, studies have shown that high school students can engage in engineering design. Complexity is another ambiguous term, yet complexity typically involves systems and their interacting phenomena. Systems thinking is a concept found in complexity, but it is also a term that has different meanings for different fields and disciplines. Engineering design often includes systems thinking facets and operations including: multiple interconnected variables, non-linearity, open-endedness, emergence, optimization, and graphical visualizations.

As the name suggests, complex systems are not easily defined and have given way to various precepts and constructs. Systems are dynamic with respect to time, with distinct variables varying along unique time scales. Complex systems have multiple interconnected variables with emerging interactions that cannot be viewed in isolation in order to understand the aggregate system. Complex systems are non-linear and unbounded. Most physical and social phenomena at the systems level do not follow a simple cause-effect relationship. Schuun (2008) defined optimization in complexity as balancing constraints, trade-offs, and requirements. In summary, complex systems are dynamic, adaptive, emergent, non-linear, and iterative. These systems are also influenced by multiple time scales, contain interconnected variables, and often include human activity as another variable."

[293 palavras]

Fonte: Adaptado de: Lammi, M. (2013) "Engineering design thinking", *Journal of Technology Education*, 24:2, 55-77.