

# Pedagogic Applications of Argument Maps to Enhance Critical Thinking: Thought Seeds, Argument Mapping, Collaborative Mapping

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## Abstract

Argument maps are used extensively in Natural Language Processing (NLP), for training Large Language Models (LLMs) to analyze and generate arguments coherently. This paper discusses the pedagogic applications of the concept of argument mapping to enhance critical thinking in learning within educational contexts. The approach was found to be useful for shaping the thinking process during thesis writing and courses with student project and can be applied in higher education. In the age of rapid Gen AI advancement, it is important to embed critical thinking into education and such approaches can address challenges like AI overuse and potential loss of key skills and competences in learners. Argument mapping necessitates learners to visualize their thinking and while doing so, they not only achieve clarity of thought, but also make distinct connections between concepts in the form of arguments. Such clarity is at a much higher level compared to that achieved through concept or mind mapping as learners need to think in terms of well-formed claims and connections between them. In addition, collaborative argument mapping tasks could give learners opportunities for peer learning, and to concretize the abstract ideas through visualization and discussion.

## 1 Introduction

The paper aims to present three ways of using argument maps in a classroom setting, and these instructional applications can be relevant in different disciplines. The first application is the use of existing argument maps as thought seeds to introduce the idea of argument mapping and to encourage students to think and reflect on their use for their learning. The second task involves manual argument mapping. The final task is collaborative argument mapping that can be suitable for project implementations or content rich courses for group activities to encourage critical thinking through visualized

knowledge construction. The tasks were used in undergraduate and post graduate programs as part of research courses, in project implementations for planning research, in the process of iteration, and problem solving, and received positive feedback during in-class discussions and feedback surveys.

## 2 Core Components

### 2.1 Argument Maps

Herman (2025), claims that "the graphical representation of complex argumentative structures extracted from texts offers significant pedagogical value" (p.1) as it enables critical analysis and reasoning that can support learning (Chang et al., 2025; Nesbit and Liu, 2025; Rider and Thomason, 2014; Twardy, 2004). While argument maps can be constructed with many levels of detail, for pedagogic purposes teachers can adapt the maps based on student level and their learning requirement weighing the effort needed in building them and the resulting cognitive and scientific clarity needed for the task. This paper introduces the idea of argument mapping as an activity for reflection using examples of argument maps available in the literature as samples AIFdb Consortium (2014); Lawrence and Reed (2014); Rowland (2025).

### 2.2 Thought Seeds

Thought seeds are inputs that expect varied outcomes over longer periods, with potentially no immediate results. They are often followed by a set of open-ended questions where varied answers are possible or by a set of rhetorical questions. The facilitator could choose to conduct a whole-class discussion after presenting the thought seed and the questions that encourage varied answers and not correcting the learners even if the facilitator is convinced otherwise. The essence of a thought seed would be lost if the discussion becomes prescriptive and if it is not an open field for discussing,





## Limitations

The complexity of argument mapping can be considered a limitation, especially when time is at a premium. There is usually a learning curve, and some students may struggle more than others. Hence, it is advisable to provide support for such tasks in the form of materials, examples, and feedback. Also starting with simple argument maps and even concept maps can ease the process. The approach and the strategies discussed were tested in the international business department in the Bachelor's and Master's programs, at Häme university of applied sciences, Finland which is a limitation. Further research is needed to establish the effectiveness of the tasks in different contexts. Future research could find more empirical evidence.

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