4. Discussion

This phase of the DynaLearn project, CLGE partners involved in WP6 developed simple models and educational material about basic concepts in each topics presented in this Deliverable. For each model, the domain expert has provided model meta-description, along with supporting scientific literature about the concepts addressed in the model. CLGE developed learning curricula for two most common categories of water bodies – rivers and lakes, which are the main source of water resources for humans (Earth Systems & Resources) including their riparian/fringing communities (The Living World).

For each topic, different models were developed in different learning spaces to accentuate different aspects of the system. The foci correspond with the learning goals associated with the models. The learning spaces used to implement the models in this deliverable are as follows:

- Learning space 1: Concept map. This LS consist of nodes and relationships, and aims to define the vocabulary used to talk about the system.

- Learning space 2: Basic Causal model. LS2 focuses on the causal relationships between the quantities in the system. This LS allows construct of simple models with structural systems and relations (e.g. see model about Binary fission). The learner can create simple models with small number of entities and quantities, and continue with more complex level.

- Learning space 3: Basic Causal Model + State Graph. LS3 aims to define the qualitatively distinct states that are important in the system. That is, it defines quantity spaces for the most important quantities. This learning space enables the learner to identify the real qualitative values and thresholds in ecological systems (e.g. see models about Urbanization and/or Legislation).

- Learning space 4: Causal differentiation. LS4 makes a distinction between processes and quantities that propagate causality (it distinguishes influences from proportionalities). As such, processes can now be correctly represented. This LS provides learners with different forms of qualitative causal relations (e.g. see models about Land-use conflicts and/or Fossil fuels).

- Learning space 5: Conditional knowledge. LS5 is similar to LS4, but allows the modelling of conditional knowledge.

- Learning space 6: Generic and reusable knowledge. LS6 models the knowledge in the model in separate model fragments. The scenarios describe different initial situations of the system from which different simulations can be run. This learning space allows construct a model using generic and reusable knowledge (e.g. see Biodiversity and/or Atmospheric oxygen and ozone models).

The developed models are part of a larger set which covers the most important topics in the Environmental Science curriculum. For a complete overview of the topics in this curriculum consult D6.2.1 through D6.2.5.

5. Conclusion

This deliverable discusses a set of successfully implemented qualitative model for the DynaLearn Environmental Science curriculum. The model topics come from the themes Earth systems and resources, Water cycle, Thermal dynamics in freshwater bodies, The living world, Human population, Land and water use, Pollution, Global changes. Particularly the following topics are addressed: Biodiversity, Reproductive strategies, Urbanization, Legislation, Land – use and conflicts, Intensive agriculture, Energy resources and consumption, Secondary production, Fossil fuels, Dynamic aspects of dispersion and distribution of conservative pollutants, Dynamic aspects of dispersion and distribution of conservative pollutants, Climate changes, Atmospheric oxygen and ozone.

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