



## Method and Tool to Achieve Necessary Level of Comprehension

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### 1. Short Summary of Current Knowledge

Many things are well known but difficulties may encounter with consistent and consequent use of them. Poor understanding is a direct result of poor communication.

*Comprehension is ability to find, evaluate, compare, manage the received information and pass it to others* [1]. In distance learning communication plays even a more important role, being weak it leads to lower quality of distance learning. Poor communication, in its turn, can be described as a presentation of facts and viewpoints in such a system of notions (usually theories, instructions, rules, customs and other man-created notions with their inherent terminology, concepts and fixed relations) that is unfamiliar to the target audience. That either creates erroneous or insufficient notion of concept or it is not perceived at all. Lack of comprehension can be a disincentive factor for students desire to develop skills and gain knowledge. Without understanding it is problematic to memorize definitions, formulas and solve tasks. Absence of comprehension does not promote a further acquisition of subject, as process itself has become uncomfortable and thus is being done only because necessary. Perception through images is generally faster – it is a well-known fact.[2,3] All people possess comprehension at intuitive/perceptive level – for example when talking about tree, sun etc., we “see” our created image or we remember the umbrella when notice dark clouds. The mentioned comprehension of everyday concepts is being gathered by observations throughout the life. The shortest way to comprehension is to find the link between already known concepts and new ones – through images. The link can be created by help of models interpreting or relating new things to familiar ones.

*Here a word "model" denotes the interpretation of concepts or relations used in a theory, rule, instruction or another notion by expressing them by/through well-known, familiar phenomena and natural, conventional relation that creates a conception that is easy to perceive intuitively – image.*

### 2. Problem Detected and Possible Solutions

We believe the main problem is to acquire effective, stable and constantly developable process/method suitable for daily use.

Each target audience chooses their own familiar concepts thus universal models are not effective. Therefore it is essential to attract representatives of target audience to develop models; of course, the process shall be under control (verifying whether the model really interprets new concept/relation). Development of models need creative approach: analogous to one required when creating illustration, anecdote, movie or any other material forming images, both from target audience and teachers/ administrators.

To activate involvement process few models shall be created by specialists of the field – teachers/ administrators. For this purpose they shall be trained lest development of models weren't occasional but constant, controlled activity aimed to concrete result – each concept and relation shall have one or better several models. Several models give more views and there are situations where only through several models iteratively can be enhanced comprehension of concept/relation – hereinafter referred to as object Necessity of direct participation of target audience derives also from actuality of process, as design of models is being affected by experience, customs, interests of audience that change quickly, and things appropriate for one age group would not suit other.

Each object can be characterized by:

- Sense;
- Place in system of notions;
- Corresponding tools.

Table 1. Elements of learning process

Object	Attitude	Solution
Sense	I don't understand	Gain comprehension
Place in system of notions	I don't know	Memorize
Corresponding tools (formulas, algorithms, equipment etc.)	I can't handle that	Train skills

If system of notions can be memorized and skills mechanically trained then sense is deeply connected with comprehension. Role of teacher involves covering all the concepts indicated in table 1 but wrong placement of sense (not being the first) leads to extra time required as each student learns, memorizes and trains object that he does not understands.

Following the previously mentioned, method is maintenance of process where:



- Learning of new objects is being done at the level of images and through accumulated models proposing images freely available to all Internet users;
- Models are mainly developed by target audience;
- At the beginning of process verification of models submitted by target audience is entrusted to specially trained teachers/administrators;
- Target audience is being involved in rating of given models: feedback is gained through voting for concrete model if it seems closer and more understandable, or proposing new model as alternative to existing model that seems to interpret the given concept unclearly.
- Tool – [www.goerudio.com](http://www.goerudio.com) is a specific web page that provides:
- Teachers/administrators function to place subject material and/or own models, as well as to verify and add submitted models;
- Opportunity for everyone to add own model: of course, after verified by teacher/ administrator;
- Vote for favourite model;
- Accumulate models and present them in descending order following the rate given by voting.

### 3. Structure of Web Page Connected with Method/Process

The specification of present web contains minimum navigation, monitoring and configuration requirements that together with design were chosen by students – it was closer to students' comfortable conception. Web page contains structured information by subjects, classes, themes where each theme has accepted definition of concept or relation and all the accepted models interpreting them. At the end of each theme there is a button allowing user to send own model to system, in case model is accepted user receives administrator's e-mail with incentive. It is essential that submitters of models can tick to attach their name to model, that provides certain publicity. It is possible to vote for each favourite model – there is button „+“ where total rating of model appears immediately. Known scientists can place their views on different problems and development of field – these appears as separate themes. At the moment it is an approach chosen by Latvian students: many things can be changed according to requirements of other target audiences.

### 4. Details of Application of Method

Note that concept, relation etc. is equal to student, teacher and specialist as only difference is in the knowledge that allows operating with this concept. Thereby models can consolidate understanding of objects. Frequently even at high level conferences participants use different terms to describe the same concept, as well as use equal terms to describe different object. It is a proven statement. In these situations the only common denominator that gives comprehension of idea is out proposed model. Models are frequently used as intermediates to gain common understanding. There have been even some precedents when due to use of models teachers recognized mistakes in subject material.

Feedback is provided by model rating (audience votes), as well if model has not achieved the desired effect for certain audience, student can develop its own model and add it to existing ones. Thus iteratively the best model complex is being developed and the majority of target audience can understand concept through images. "Almost" is used because there will always be individuals who would not recognize given models and at the same time would not be able to create their own. In these cases teacher/ administrator shall take part and try to find out – probably through dialogue, what kind of models require individuals with poor comprehension to help them gain comprehension.

To encourage development of comprehension in various target audiences direct contribution of most erudite representatives is being used. To create a model large creative potential is needed. Of course, there are fields where target audience cannot develop their models, for example, people with special needs: there models can be created by specially trained teachers/administrators – through iterative the most appropriate models are created/selected. Due to the fact that models are the main mechanism creating comprehension (by transferring formal definitions to images – intuitively perceptible and well-known for the majority of target audience) contribution of target audience is essential.

As it was mentioned previously – method is a process providing development of comprehension. Indeed, if process stops, majority of the audience stops participating; - models just lose their actuality and users - interest. Accumulated information can be published for some period of time but will soon lose actuality. The task of this method and tool is to be constantly updated aid in learning process, that can most probably even lead to changes in educational standards: if students in shorter time can acquire the same knowledge or in the same time – more material.

### 5. The Structure of Learning Process Using Comprehension Enhancement

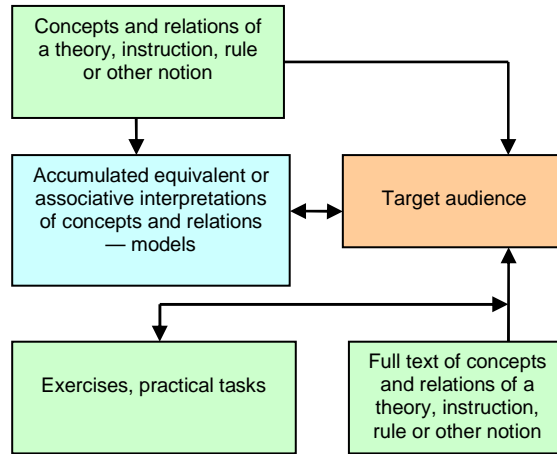


Fig1. The Structure of Learning Process Using Comprehension Enhancement  
The Structure of method realized by tool – [www.goerudio.com](http://www.goerudio.com) is shown in scheme below.

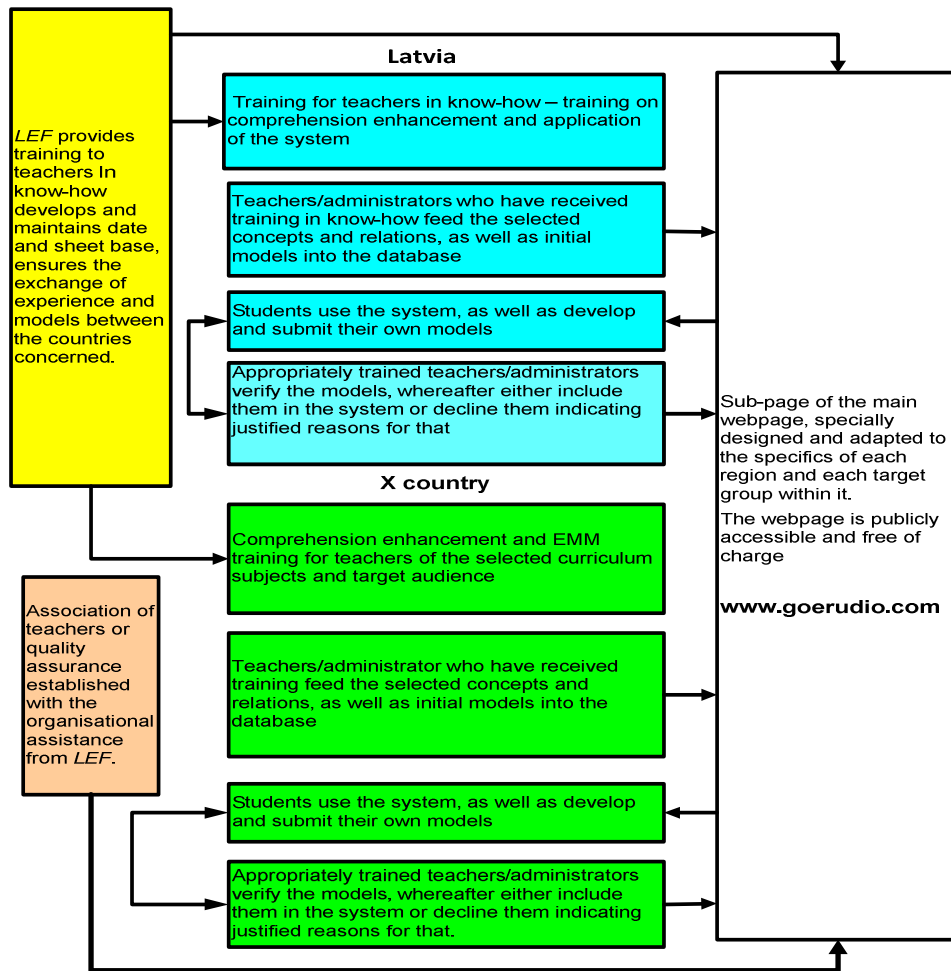


Fig 2. Project structure



## 6. Effects obtained

Comprehension through [www.goerudio.com](http://www.goerudio.com) tool is gained by using familiar models in concrete target audience reducing time necessary to gain comprehension as process is being reduced to comparison or substitution of familiar objects with new, to be learned objects. To build the method, tool frequently found in mathematics – substitution was used. If comprehension of new concept can be replaced by already established one we have substituted it, according to theory it shall result in significant reduce of time required to learn a new concept. Actually a key to success is substitution where are used objects familiar to target audience, that explains why these can be defined only by target audience. The approach can partly solve problems caused by cardinality – exponentially increasing number of new objects, the content of subject material meant for comprehension shall be enlarged.

The main innovation of method and tool is targeted, creativity requiring, controlled participation of target audience in development of comprehension models, where process is being constantly supervised by specially trained teachers/administrators, as well as configuration, design and navigation accepted by target audience to achieve accumulation, display and attachment of information as close to desires of target audience as possible. Target audience shall be motivated to create models. As motivation tool is being used inclusion of author's name in exposition of model – publicity, as well as different promoting competitions.

## 7. Reality

At the moment the web page successfully operates in Latvian and contains concepts and relations according to educational standards of full secondary school course in physics, chemistry, biology and mathematics, as well as accumulated models interpreting them according to Latvian needs. At the moment web is being actively used by Riga Distance Learning Secondary School students (many of them live abroad), as well as students of presence schools. Official available statistics show – results in schools where the tool is actively used are much better than in other.

*This method do not ask changes in existing material to be tough, but only helps to acquire this material better and quicker.*

*The authors who created the present content of web were awarded by Latvian State established Education Innovation Award in year 2011 by the President of Latvia.*

## References

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