

## Aspects of Learning Material Creation

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### Abstract

*This article deals with aspects of learning material creation. We have acquired experience with creating learning materials for Autodesk Map 3D 2005.*

*There are some aspects, which have to be considered when creating learning materials:*

*The content of the learning material is determined by the type of software. The software for creating GIS has all operations for creating data, cleaning data, attaching database, creating topology, network analysis creating thematic map export and import data etc. User interface including the operating system specifics has to be taken into consideration as well as the way of using the software. The third aspect is the type of a user, which will use this material, (beginner, intermediate or advanced user in GIS or in CAD programs). The form of learning material is also important. We have decided for a set of thematic examples, which describe solution step by step. Solutions are illustrated by screenshots of map area, screenshots of dialog window, menus and icons. Examples are divided into groups demonstrating basic functions of the software. The fifth aspect is choice of training data. Examples use accompanying data in separate directories sorted by examples. The same data is used during several examples. User has starting drawings and also final drawings (solutions).*

*All these aspects have been considered in order to reach good quality of learning material. We hope that this material will be used not only at the university but also by user in practice.*

### Abstrakt

*Tento článek pojednává o zkušenostech získaných při tvorbě výukového materiálu pro GIS software Autodesk Map 3D 2005. Tento výukový materiál jsme vytvářeli na naší katedře pro potřeby výuky nového předmětu pro obor Aplikovaná geoinformatika. Projekt byl podpořen Autodesk Academia GIS Grantem.*

*Na konečnou podobu výukového materiálu mělo vliv řada faktorů. Mezi hlavní faktory je možné zařadit: typ softwaru - jeho zaměření a rozsah, uživatelské prostředí a operační systém, typ budoucích uživatelů výukového materiálu, forma výukového materiálu a správný výběr cvičných dat. Nad všemi těmito otázkami jsem se museli zamyslet a stanovit si rozsah výukového materiálu a vhodnou formu. Výukový materiál obsahuje cvičné příklady rozdělené do kapitol podle tematiky práce. Každá kapitola obsahuje stručný teoretický úvod. Řešení příkladů je popsáno po jednotlivých dílčích krocích, kde postup řešení je doplněn ilustrujícími obrázky menu, dialogových oken a výřezů mapového pole. Dále jsme nachystali cvičná data, která jsou vhodná svou velikostí a názorností.*

*Výsledný výukový materiál byl již použit ve výuce v zimním semestru školního roku 2004/5, kde se ověřila volba jeho formy, struktury a obsahu. Tento výukový materiál je vůbec první výukový text v českém jazyce pro produkt Autodesk Map.*

## **Introduction**

We have acquired experience with creating learning materials for Autodesk Map 3D 2005 software. Together with our four students we prepared learning material during year 2004. Autodesk Map 3D 2005 is the latest version of software for GIS produced by the Autodesk company. This version was released in spring 2004. We had only a limited time to prepare this material (about 5 month). We prepared learning material for education of this software in our study of geoinformatics at the university. This work was supported by Autodesk Academia GIS Grant 2004.

There are some aspects, which have to be considered when creating learning materials: type of software, user interface of software, type of users of this material, form of the learning material, choice of training data.

## **The first aspect - type of software**

Content of learning material is determined by the type of software. This is software for creating geographic information systems. It has several functions, that are needed in GIS. There are functions for creating data, cleaning data, creating attribute data (object data and attaching to an external database), functions for creating topology, network analysis, functions for creating thematic maps, functions for output to printer, functions for data export and import, functions for feature classification, functions for creating 3D surfaces etc. in this software.

In this learning material we described how to use all the main functions correctly. It was necessary to consider continuity i.e. sequences of some functions (where one precedes the other).

## **The second aspect - user interface**

User interface including the operating system specifics has to be taken into consideration as well as the way of using the software. Autodesk Map is an application running on Microsoft Windows operating systems. User interface is divided in several windows. In the first chapter of material we describe the basic workspace in general.

Autodesk Map has three possibilities how to call operations: from menu, from workspace manager and by a command from the command line. Let's look how functions are called from **menu**. There is a complete set of menus for mechanical engineering in AutoCAD. There are also two new menus for Map operations – *Map* and *Civil*.

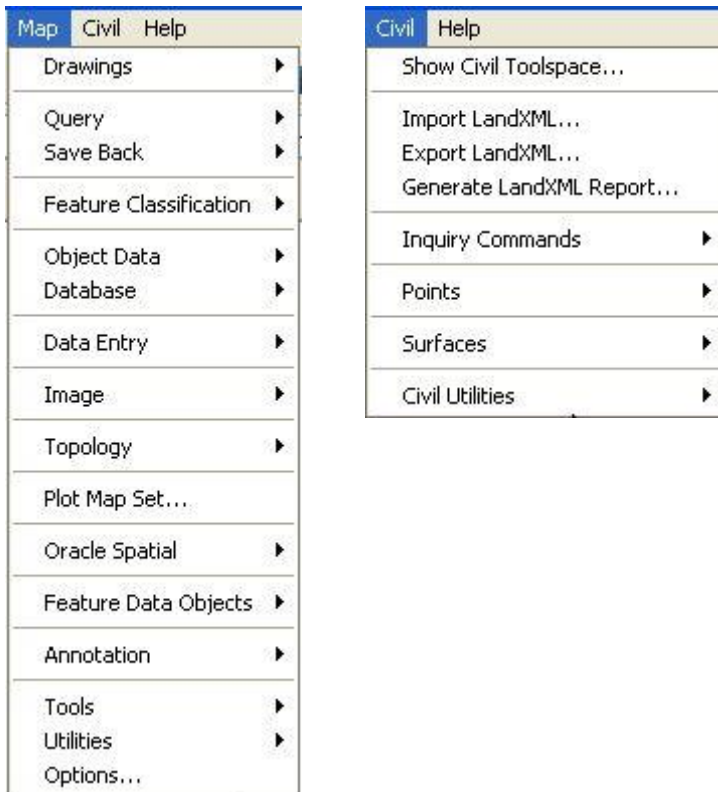


Fig. 1: Menu Map and Civil

The **Workspace** window serves for management of the drawings. It is the second possibility how to call some operations. The operations are called by pressing right button of the mouse.

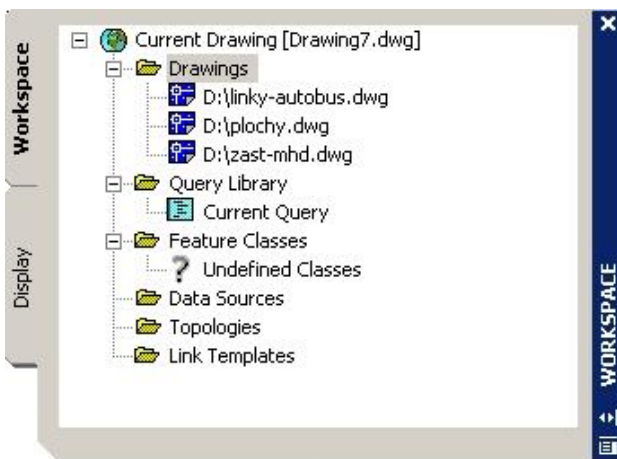


Fig. 2: Workspace manager

There is another possibility how to call operations. You can write a command in the **command line** for calling operations. Command line is also used for input of parameters.

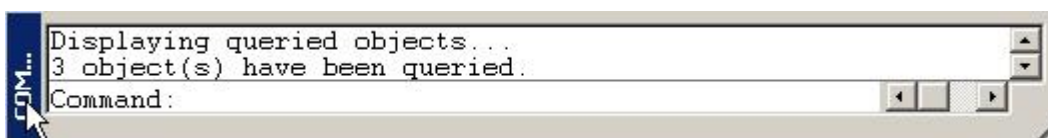


Fig.3: Command line

Also **dialog windows** are often used for setting parameters of operations. The **wizards** are used for creating some operations, for example for cleaning data or creating thematic maps. In the learning material we described the best ways to call the operations.

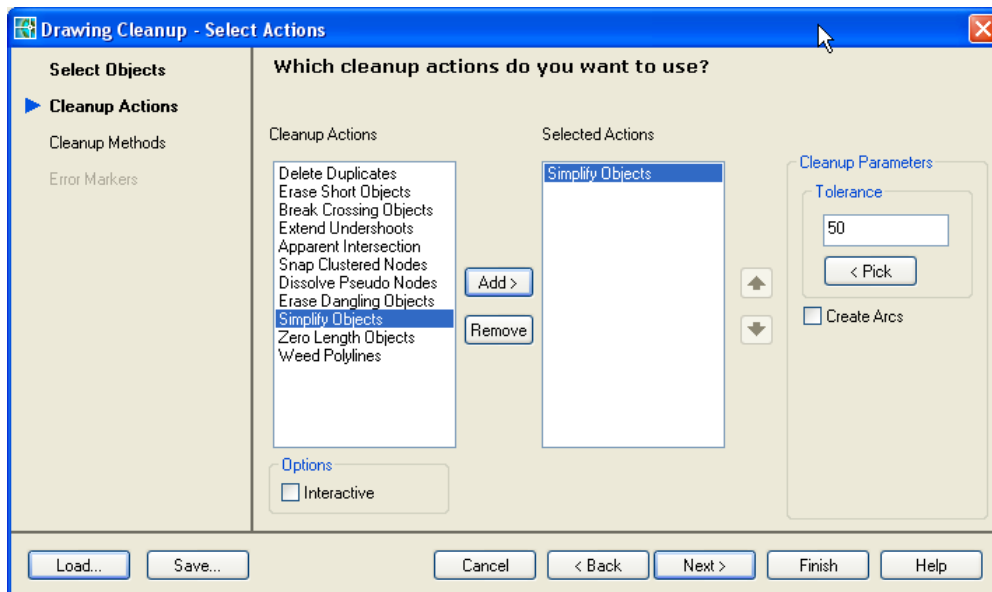


Fig. 4: Drawing Cleanup Wizard - step2

## The third aspect – the type of user

The third aspect is the type of user, which will use this material. We considered different types of users (beginner, intermediate or advanced user in GIS or in CAD programs). We prepared this material for intermediate users of GIS but beginners can use this material as well. Theory of GIS is only briefly mentioned in introduction of each chapter or example. We also suppose that users have at least basic skills of drawing in AutoCAD. It is better when users have some experiences or knowledge about geographic information systems.

## The fourth aspect - form of the learning material

Form of learning material is also important. The material is divided into seven chapters.

1. Introduction to Autodesk Map
2. Data Creating and Updating
3. Attribute data
4. Creating of Topology
5. Data Categorization and Thematic Maps
6. Civil Objects
7. Creating Map Outputs

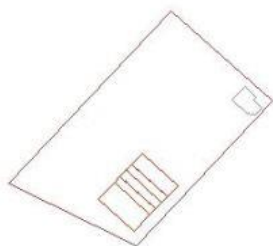
Every chapter is divided into more detailed parts. The whole material has about 130 pages.

We have decided for a set of thematic examples, which describe solutions step by step. The steps are numbered. The number of step must be reasonable (maximum about 20 or 30). Examples are divided into small groups demonstrating partial solutions. In specific cases a user can skip some sub-tasks by using prepared solutions (drawings) and continue with the next example.

### Import ArcView ShapeFile

Do výkresu botanické zahrady budete importovat hladinu sadů z formátu shp.

1. Otevřete si soubor z adresáře \Import\zahrada.dwg



I

2. Z menu Map > Tools > Import ... vyberte z adresáře \Import\ soubor sady.shp.
3. V dialogovém okně ponechte volby sekci Spatial Filter None, zaškrtněte volbu Import polygons as closed polylines.

Fig. 5: Solution step by step

The difficult or important steps are illustrated by screenshots of a map area, screenshots of dialog windows, menus and icons. These screenshots are very illustrative. Verbal description of a dialog window is also necessary but if it is not accompanied by a picture it is usually very lengthy and difficult to understand. For example in the “Define Query” dialog window (on Fig.6) you must describe: *In section Query Type choose And, in Query Mode choose Draw, push button Location etc.* Quick view on screenshot is faster and more comprehensible.

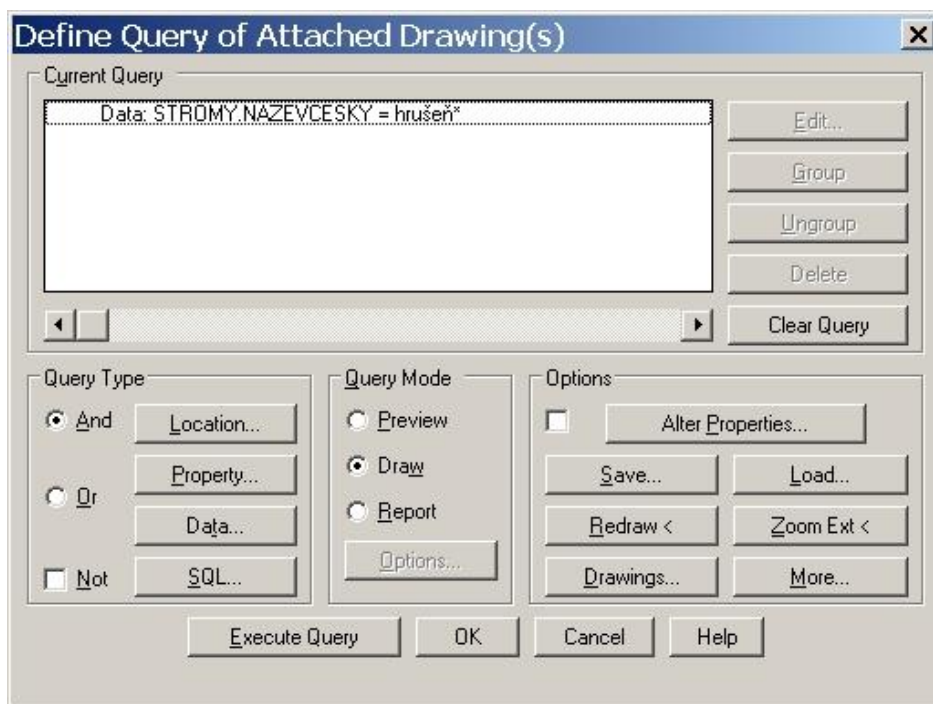


Fig.6: Example of screenshot of the dialog window

It is important for users to see a map window with the results of operations. There are also screenshots of map cut-outs in the map window where it is necessary to zoom in the required area.

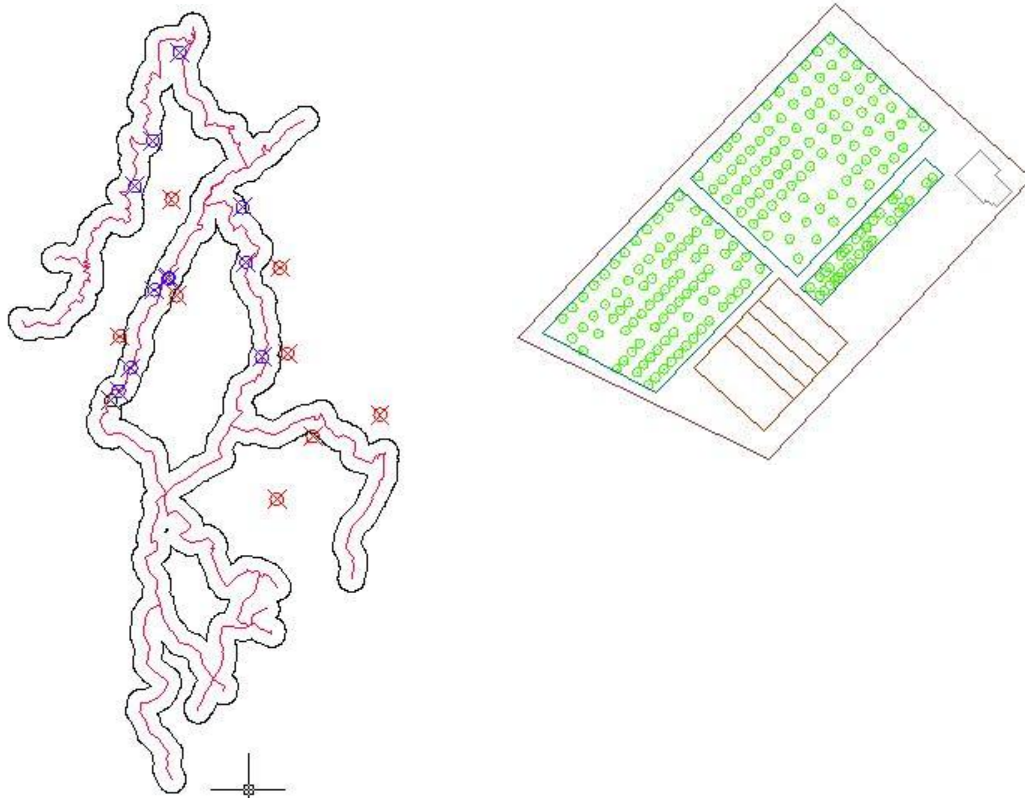


Fig. 7: Result of buffer and overlay analysis and a map window of botanical garden

### **The fifth aspect - choice of training data**

Data accompanying examples are organized in 14 directories according to topics.

Autodesk Map is installed with the training data. We use a part of this data. The data is from American town Sheboygan (street centrelines). Also data of the Czech Republic are used - road network, botanical garden in Olomouc etc. It is important that the same data is used during several examples. It is suitable for users because they already know the data from previous examples. Users have starting drawings and also final drawings (solutions) available.



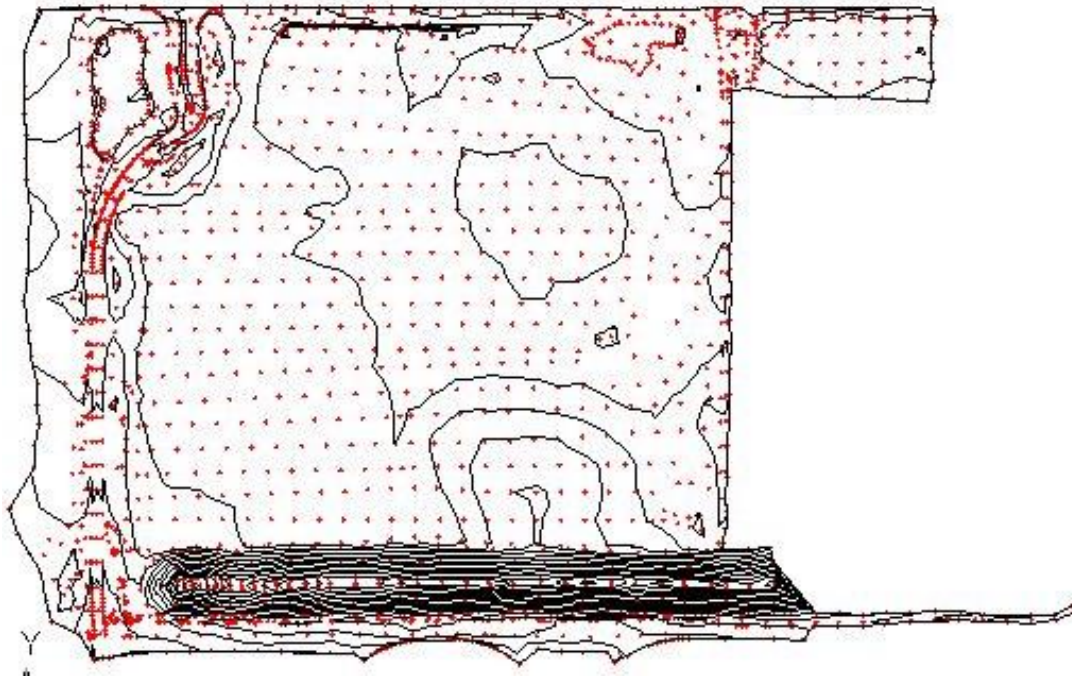
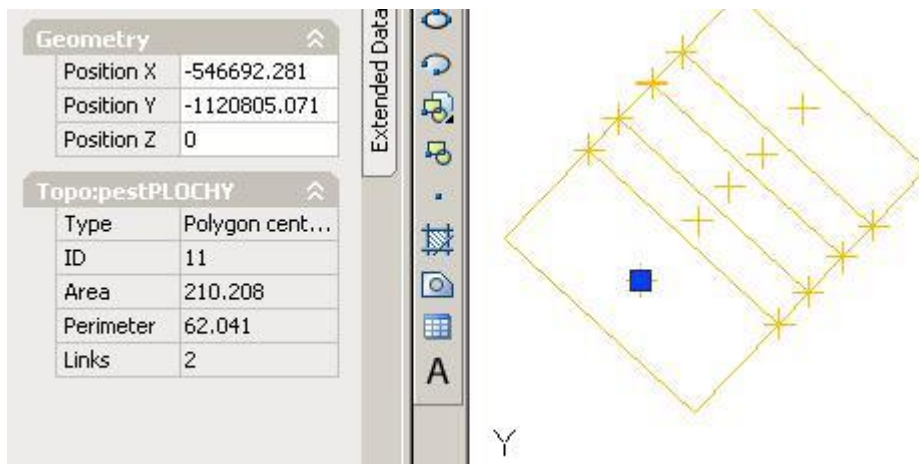


Fig.8: Map Tutor Data for training surface creation

Data has to be suitable and easy to use for the specific task. It is not good to have a lot of data. Small and clear amount of data is more appropriate for demonstrating the functionality. For example to demonstrate manual connection object of botanical garden to a database only five records were used. Large data would be confusing and also their processing would be slow.



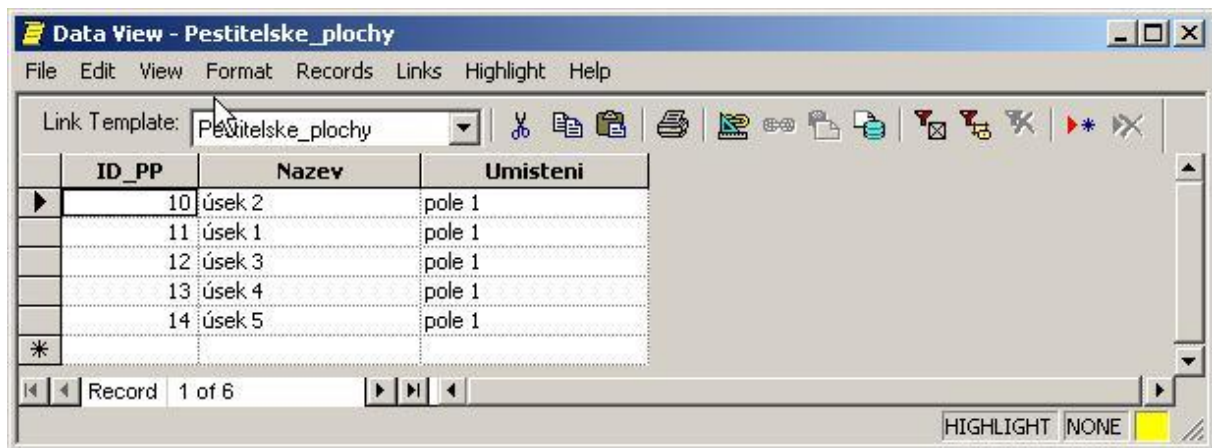


Fig 9: Manual connection of five records from external database

## Conclusion

All these aspects have been considered in order to reach good quality of learning material. We hope that this material will be used not only at the university but also by users in commercial sphere. We tested this material on students of study branch Application geoinformatics at Palacky University for one semester. The material proved to be very successful.

In the process of creation of the material it was necessary to prepare the testing data. This was quite laborious. Another time consuming part was to describe separate steps and choices in the dialog windows and to scan the illustrating pictures. The complete material has about 130 pages and consists of about 40 tasks. It is also available on the Internet [www.24hdesign.cz](http://www.24hdesign.cz).

The localized Czech version of the Autodesk Map 3D 2005 is available at present. We plan to work out an extended version of the learning material for the Czech version of the Autodesk program during the year 2005. All experience we have acquired will be used in the process of creating the new material so that it is as useful as possible.

## Literature

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3. Slavata, P.: AutoCAD verze 2004, Tvorba 2D technické dokumentace, Kopp České Budějovice, 2003, ISBN 80-7232-211-7
4. <http://www.autodesk.com>