Collaboration of (Landscape Architecture) Students to Raise Consciousness of Trees

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1 Introduction

Most of the features that have the greatest influence on our environment, including the climatic effects of urban vegetation (vegetation index) and other geographic features can be obtained in an enormous amount using remote sensing technologies. However, these indices cannot be directly perceived by humans, hence cannot be understood by ordinary or local people concerning the biological value of their environment. Ordinary citizens are not sensitive to these abstract scientific values, hence the gap between the quality and amount of data obtained by the sensors and the data comprehended and understood by local people is rapidly growing.

Information technology helps us to visualize and familiarize with the landscape and provide mass information about the environment. However, the increased usage of computers lessens the time one actually spends with real natural environment. Students are being criticized about spending most of their time in front of computers instead of observing nature or doing outdoor activities.

2 Material and Methods

2.1 IT knowledge of students

A recent study (DOOR et al., 2012) conducted at several US universities revealed that college students have rather advanced computer skills (approx. 60 % of first-year students have good IT skills, ~25% have excellent skills and only about ~15% of students have poor IT skills). This study also points out that the IT skills of students is about 15% higher than that of the faculty skills. It can be concluded that the increased use of computers did result in better IT skills – but according to the same report – most university professors do not think that the increased use of IT technology has any positive impact or beneficial for the quality of education and it results in a deeper understanding of the subject.

The goal to enhance the quality of Landscape Architecture education – obviously would be to use expertise of IT skills of the students to enhance their fundamental understanding of the complex issues of landscape development, but this process does not happen automatically.

I think a new approach is necessary to use digital knowledge to support traditional landscape studies, and since most students are more familiar with the digital world than with real nature – we should use the digital world to understand our physical and natural world better.

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This is a rather inverse effect compared to the traditional learning process (that starts from natural experience and becomes more abstract and digital). The current trend should be based on the students' advanced digital knowledge (primary skill) to enhance their knowledge and concentration on real-world issues (secondary skill).

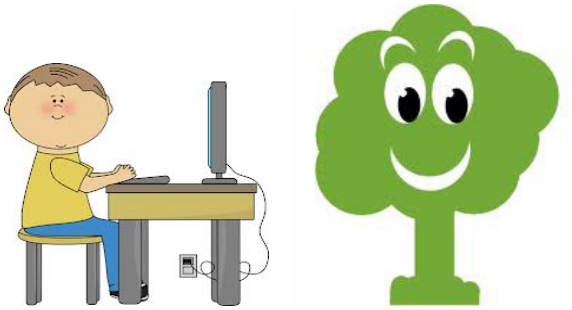

Fig. 1: A typical student of Landscape Architecture

The primary learning usually comes from personal experience and observation of the local environment. This mostly occurs in elementary schools. From personal and local experience, the students get broader and extended knowledge about the regional and global environment.

Fig. 2: From local observation

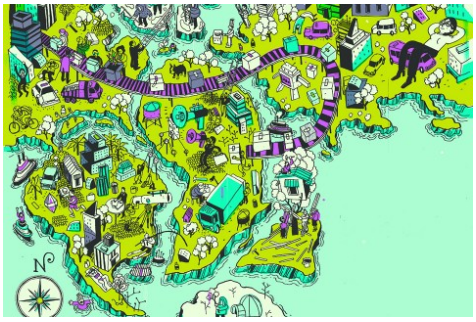

Fig. 3: Making regional connections

2.2 New approach with IT

It is specific to the generation of the digital age as students are becoming older and more mature, their connection to the real physical world decreases and the virtual environment will take an increased proportion of their lives.

Instead of fighting with this tendency, we rather have adopted to the knowledge acquisition methods of the young generation. In order to incorporate global knowledge to understand our personal and local environment the curriculum of landscape architecture must be reshaped and rearranged.

The use of computers can offer several new methods to have a broader perspective of a complex phenomena. Assignments still should start from the surrounding world and should be related to it, but the conclusions and findings can be more general both in spatial and temporal dimensions. The scope of the problem may involve larger geographic regions and

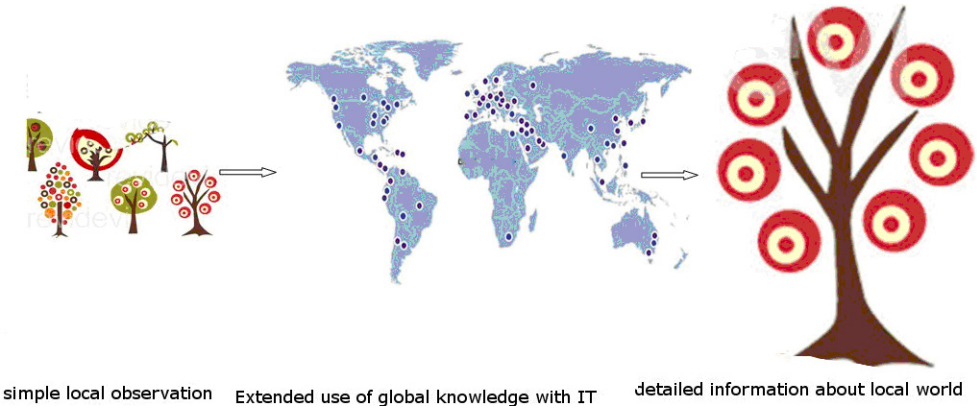

Fig. 4: Process of shared knowledge

we may ask questions about expected future situation (prediction). Modeling can serve to estimate future scenarios (temporal modelling) or spatial distribution change of the habitat zone (BEDE-FAZEKAS & CZINKÓCZKY, 2012).

The choice of the given IT platform is arbitrary. A special website can be set up, but it is possible to use even one of the most common social media website (i.e. Facebook), because the students are highly interested in social communication and spend a lot of time in this digital environment. The platform should not be designed rigorously, the students will naturally find the most convenient features for communication. Considering the shared information strategy of Web 2.0, shared knowledge is rather common (Wikipedia, Facebook groups dealing with certain topic, etc.). Even there are several open and free

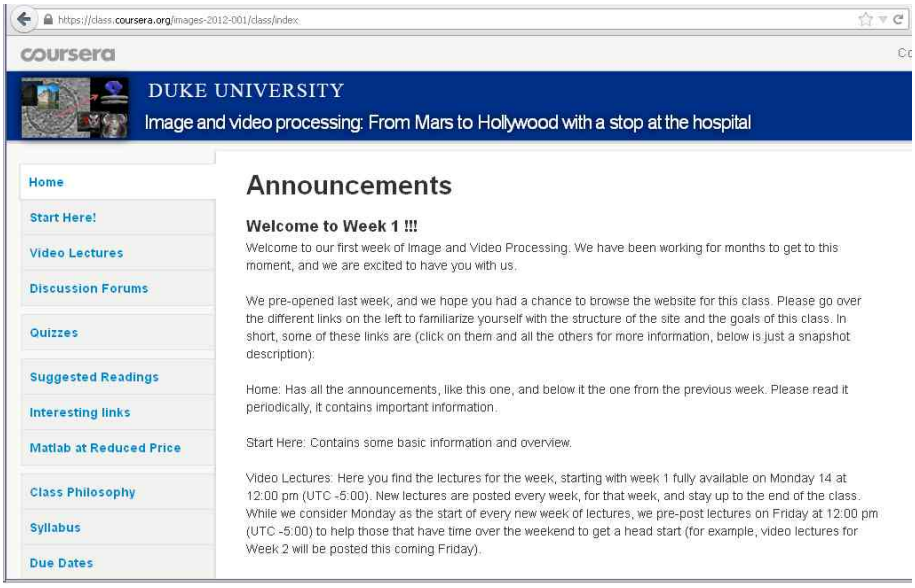

Fig. 5: A platform for a coursera.org web-class

international web-classes https://www.coursera.org/ where one can register for courses offered by the most prestigious universities for free of charge.

This website has a complete course material with discussion forums and on-line quizzes. It might be possible to offer a similar solution for landscape planning but it is rather time consuming and expensive to develop and our goal is not necessarily to offer a worldwide on-line course, but rather exchange ideas, data and communication of the practical issues.
It is impossible foresee and predict all platforms and topics for collaboration, but starting with some practical examples certainly can increase the chance for further cooperation and sharing of ideas. As a lecturer of Mathematics for Landscape Architecture students, I have noticed, that even the future experts of landscape design have no clue about quantitative description about very basic and simple primitives of urban environment, such as the biological values of trees or bushes, their volumes, canopy areas or carbon dioxide absorption capability.

I gave an assignment to my first year Landscape Architecture students in Math to record a tree on their street, determine its height suggest that every student of Landscape Architecture is actively involved in a project called „my personal tree" where he/she gives a full description of a tree located in a city (including a picture, location with GIS coordinates, marking on Google Maps, identifying the type, approximate age, volume, canopy or other relevant characteristics).

3 Why Should LA Students Work Together and Who Should Organize the Collaborative Landscape Architecture Projects?

Students – like most people – follow trends or act together mainly because they see examples on TV, media, or just simply join certain campaigns or publicly organized events (critical mass, Earth day, etc.). Besides the regularly coordinated activities, there are other spontaneously organized gatherings and actions related to other public issues often for the purposes of entertainment, satire, and artistic expression. A famous example for this is the flash mob. Young people like unusual things, prefer surprises or actions that have not been seen before. That's why it is important to bring up new approaches and coordinated projects in science that are not standard, yet relevant for the young generation.

It is not feasible that media or other public campaigns will initiate project related to specific scientific field of landscape architecture. Popularity will not bring up every important issue, so it is the responsibility of the schools, universities or other international organizations (ECLAS, DLA conferences, etc.) to initiate and coordinate such wide scale cooperation. Things should be decided in a broad platform and narrowed down and tailored according to the actual school curriculum. In the present paper we are not proposing universal and everlasting projects, just we would like to mention a few samples, complex approaches of the cross- curricular cooperation that is primarily based on the IT technology.

4 Sample Project of Personal Tree

I found it to be a fun assignment for students to select a favorite plant in their local area (my Personal Tree) and try to estimate several complex attributes of it. In a case of a tree, the

volume (amount of wood) can be important. The mathematics assignment asked to substitute to an approximation formula

$$v = (p_1 + p_2 \cdot d \cdot h + p_3 \cdot d + p_4 \cdot h) \cdot (\frac{h}{h-1.3})^k \cdot (\frac{d^2 h}{10^8}) \quad (1)$$

using specific parameters of a given tree.

Estimation of the height of a tree using a picture taken by a student

height of tree
approx. 4 times of the height of student = 4 x 1.76 m
7m

Fig. 6a: Estimation of a tree height **Fig. 6b, 6c:** Measuring diameter of a tree

The assigment asked for a complete documentation:

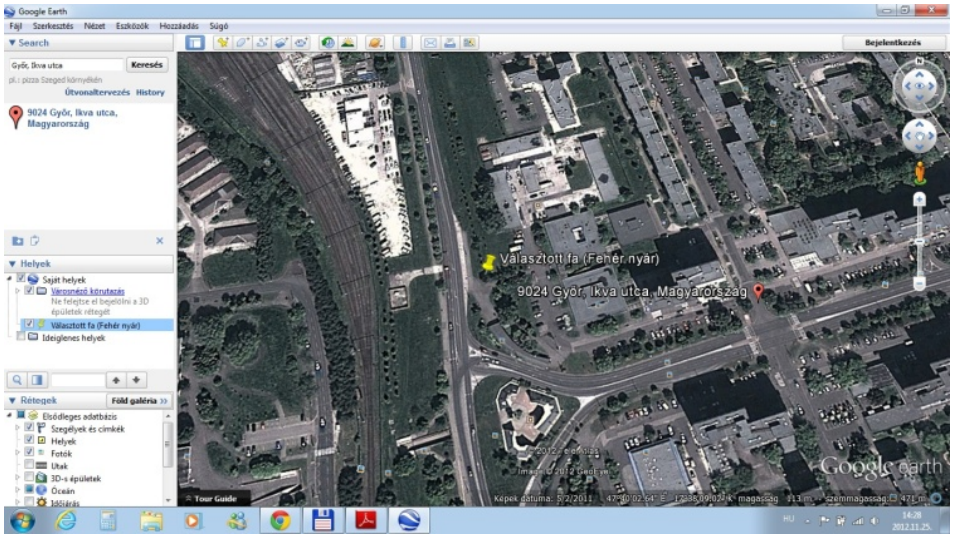

Fig. 7: Displaying the site on Google Earth with place marker

For the given type of tree (*populus alba*) the parameters of the volume formula (to be found in a table):

p_1=3184.75 p_2=–0.34 p_3=10.21 p_4=247 k=3

Substituting the values into the formula (1), we get: tree volume is: 0.236m^3=236000cm^3

4.1 Habitat-range- mapping and personalization

The sample project above describes only one possible way how digital knowledge can be used to enhance the information obtained from personal world. There are some further possibilities to extend this problem of „getting to know my personal tree". It is possible to ask the students to display the habitat zone of the tree (by googling the habitat information from Wikipedia, displaying it on the map and making a real-life connection with someone who lives at the most distant part of the earth and shares the same attributes of living nearby a similar tree.) These projects may sound somewhat childish and not very scientific, but fun increases motivation and may create memorable events.

4.2 Temporal modeling

Besides recording certain physical parameters it is also important to include an attribute that shows the physical condition of the tree. Moreover, since the green value protection and maintenance is important if something is not adequate (such as the critical root zone or tree protection zone is blocked so that the tree cannot receive sufficient amount of rain due to the urban pavement), should be listed.

The first step is to create a regional database with predefined attributes which has to be designed by an appropriate group of experts and the second step is to combine the regional databases into national or larger scale units.

The maintenance of the database is also important, specially for the endangered objects. I think with this project we could enhance the public awareness of the biological importance and values of trees and with joint effort it will be possible to preserve the current urban vegetation and increase the quality of it even further. As a methodology, I suggest using mobile technology, smart phones that can be used as cameras for image capturing, data transmission.

And to add a trendy platform for communication , the most common social networks (FB or Twitter) could be added to make it suitable for students' communication and exchange of ideas.

One can argue that these platforms may not be permanent or scientifically rigorous , but they only serve as a gateway to connect participants. Moreover, the landscape related public projects do not need to be exclusively designed for experts. The wider the range of participators, the higher the social impact that can be achieved. Our final goal is to raise public awareness and activity towards environment consciousness and nature preservation and increase public participation in community related „green" issues.

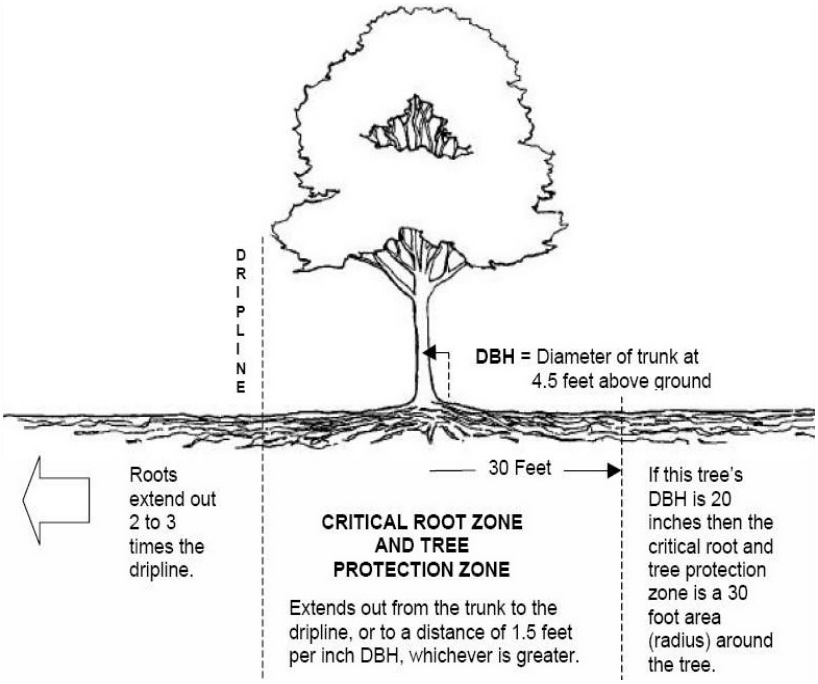

Fig. 8: Critical root zone of an urban tree

I suggest to develop an open source **tree – or landscape values database** which is shared and maintained by several universities and have a joint project of a year.

It is impossible to monitor every tree in a large city, but the most frequented downtown areas certainly deserve extra attention. It has happened many times in Hungary that the city has planted valuable mature trees and they died very quickly do to poor design of pavement or inadequate care. This deterioration can be prevented by regular monitoring of the condition and updating the tree database (i.e. every semester). The database can be used to query similar trees in different countries or regions and find common solutions for

Key aspects to consider (physical parameters) in case of a tree:

- the location (address and Geo-coordinates);
- species;
- size;
- age;
- overall health (scale 1- 10);
- recent changes of pavement or landscape;
- soil;
- Will roots pose a problem to sidewalks or driveway?
- Is it a high maintenance tree that will require frequent spraying for insect or disease control?
- Does it drop messy fruit pods or seeds?

- How adaptable is it to environmental changes?
- Is it in danger or critical situation? (scale 1- 10 = most critical situation)
- If in danger, what measures should be taken? (pavement, soil change, watering etc.)

The database can be filtered and queried and immediate measures should be taken to save the most endangered trees.

5 Critical Issues to Be Considered

5.1 Roots covered by pavement

If a large area around the tree is paved, the surface should be porous to allow water and air to penetrate. If brick or flagstone is used, joints should not be mortared. When pavement is nonporous, an opening should be left around the trunk of the tree. This opening should be approx. 2 m in diameter for small trees. The opening should be larger for mature trees unless the roots extend beyond the pavement into uncovered soil.

5.2 Interdisciplinary cooperation

When a database is set up, one probably immediately assumes an IT related task. It is indeed, but setting up a professional tree – database is more than just a routine IT procedure. Needless to say that it is essential to use relevant attributes of trees, which can correspond to the healthy urban habitat conditions, and can detect climatic changes or risks as well. For the best result, Landscape Architecture and Dendrology experts can join IT experts in finding the database structure and platform that can manage the tree related data.

Landscape Architecture students could take part in data acquisition, checking urban sites which are suitable for obtaining data, and setting up a framework for regular maintenance. Maintaining a database and providing valid data is a long-term task, so yearly student surveys can be organized to keep the data up-to-date.

IT involvement is not necessary a long term condition, it is primarily important at the beginning phase or when a different platform / system is used, but this may not happen regularly.

5.3 Realization of the database

The actual physical database could be realized in a LAMP-software stack (LINUX – Apache – MySQL – PHP) environment. This article does not intend to discuss the scope of technical details, it rather wants to introduce the concept only. The actual programming environment is beyond the scope of this paper.

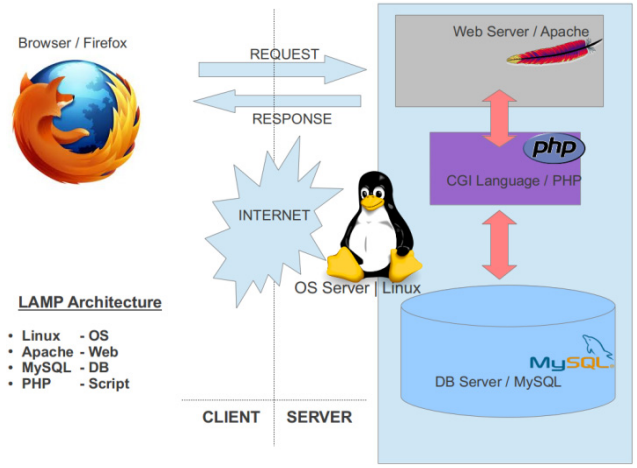

Fig. 9: LAMP environment (http://en.wikipedia.org/wiki/File:LAMPP_Architecture.png)

6 Summary

The aim of this paper is to raise the awareness of Landscape Architecture students concerning their local environment and to connect them with other students with different nationalities facing similar problems. Joint projects can be more enjoyable and fun by pointing to the similar problems of Landscape Architecture in different countries. This project is aimed to show our local environment in a larger perspective, hence it might serve as changing or reshaping our attitude towards nature using IT and scientific methods. The joint cooperation's can be performed at all levels of Landscape studies, i.e. it is possible to have BSc, MSc or Ph.D. level cooperation.

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