UDC 004.9

O. Rolik, O. Amons, K. Ulianytska, M. Khmeliuk,

A. Kovalska, A. Hrytsenko, K. Palii

STORAGE AND DISPLAY CURRICULA OF THE DEPARTMENT USING DIAGRAM'S VIEW FOR WEB APPLICATION "IST SYLLABI"

Abstract: Curricula and syllabus – are the main parts of each educational process in every institute, university, school etc., as so there are a lot of materials, research exist for creating methods of clarification curricula and best representation of syllabi for each person related to educational process or who will be involved in the future.

Syllabi defines the mainstream and provides all necessary information for each discipline and for curricula. In educational process very important to have fast mechanism to search syllabus for each discipline, but not only. As syllabuses are strongly connected to curricula, we need a curricula management system to be implemented as well. Among all semesters, specialty, courses, forms and other data provide for curricula mechanism to monitor not only schedule, but department program needs to be developed.

The main task of educational units is not only to facilitate the work of the teaching staff, timely provision of students with the necessary information on training, as well as improving the interaction of departments and institutes with each other, but to clarify educational process as well. You can cope with this task by creating a resource that will contain updated, relevant data on curricula in various disciplines studied at the departments. With this service, all students, teachers, and others have the opportunity to learn all the current and past curricula of each stream and semester. An important task is to navigate and correctly represent syllabus information and it better to be done as WIKI-document – well-structured, referenced and quick navigation inside of text.

Current material provides a mechanism to demonstrate curriculum diagram for some department for each year of education. Based on modern technology mechanism was implemented in Faculty of Informatics and Computer Science of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" department of Information Systems and Technologies WEB-site and added quick search, using main attributes to monitor necessary syllabi as well. The system includes partially syllabus and curricula management system elements. For using WIKI-document view markdown structured document was used to generate each syllabus for provided system.

Keywords: curricula, syllabus, syllabi, syllabus management system

Introduction

The main place of the educational process is devoted to clarification of discipline and course content to let students choose and understand what they really need to study. Syllabus of discipline may answer many such questions.

The expediency of use is due to the large amount of information about a particular discipline, as well as all the accompanying and additional information that must be displayed next to the main. Also, the need for this WEB application is to implement and integrate new technologies into the educational process as quickly as possible. It is well known that syllabus helps the teacher to effectively organize the work during the courses, and students - to know the curriculum and rating system. For example, in the past, in order to find the necessary information, a student studying at this educational institution had to find out the teacher's phone number and call him and wait for a response from the teacher. Now with the help of the syllabus service you can find information freely and easily. And most importantly, this information is approved by the dean's office and the department, and therefore it is reliable. This document explains the mutual responsibility of teacher and student. But in today's world it is most convenient to have instant access to syllabuses. For this purpose, the WEB application "IST Syllabi" was created and improved.

The practical task is the timely coverage of all available useful relevant information for the dean's office, teachers, students, entrants, outsiders who are interested in the institute / university / faculty / department. In practice, all these people use this development for different purposes. It is important for students to know the rating system and the number of credits in time, the dean's office needs to understand the general situation in all courses, teachers try to check their workload, entrants are interested to look at the disciplines to be studied. Such criteria characterize the feasibility and necessity of this development.

Analysis of existing applications and works
devoted to curricula management

Current research work related to a problem of educational process clarification for lecturers, students and others whom it might be concerned. Each educational unit should have some WEB-resource not only to describe and meet this unit but for cooperation between those who is working and studying there.

Curriculum management study is a big area, where the educational process can be built. Curriculum management study exists in varies fields. The research domains mainly include social science (13,984 79.995%), science technology (12,084 69.126%), life science biomedicine (8,866 50.718%), technology (4,436 25.376%), physical science (979 5.600%) and arts humanities (690 3.947%) [1-3].

Top ten research areas mainly include educational research (11,763 67.290%), health care science services (4,656 26.635%), psychology (3,712 21.234%), behavioral sciences

(3,596 20.571%), computer science (2,726 15.594%), business economics (2,368 13.546%), engineering (1,845 10.554%), general internal medicine (1,746 9.988%), public environmental occupational health (1,508 8.627%), and nursing (1,369 7.831%) [4-6].

Curriculum management study began by raising questions as to what to do about curriculum and instruction, and questions that have struck responsive chords in the hearts of not only people in educational circle but also those out of the circle [7].

Each unit of curricula is related to syllabus – the main and short document for each discipline in educational plan.

A syllabus is a well-structured document for each discipline, this document should have format and materials that need to be collected, prepared and updated by some guidelines and procedures in management system. Before development had begun, some WEB sites with syllabus management systems were analyzed.

Open syllabus explorer (https://opensyllabus.org/) WEB-site includes part for syllabus monitoring and review for each educational unit, that registered in this system. This WEB-site uses resources of each university and doesn't provide its own mechanism. Nevertheless, site proposes to share syllabi, but there is no search or monitoring for syllabi (Fig.1).
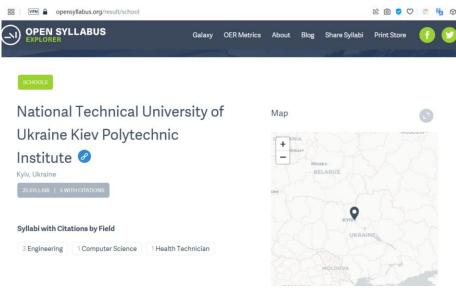

Figure 1. Open syllabus explore resource.

The site contains several countries in the list. Having chosen the Ukraine, and KPI see the figure above. However, the user, expecting to see the existing disciplines at the departments of KPI, cannot see them. Although the page says "Curriculum with quotes." If you click on the inscription, the user is redirected to the official website of the KPI. However, users entering the site expect to see the curricula, so the disadvantage of this site is the immediate fact that it does not link to another official KPI website with working curricula of

the department with the display of syllabuses of disciplines (https://ist.kpi.ua/syllabuses/uk/). We have the same situation for other countries.

Syllabi business Rutgers (https://syllabi.business.rutgers.edu/) – WEB-resource for particular business school (Fig.2).

Figure 2. Syllabi business Rutgers explorer

Choosing a certain discipline on this site, the user wants to see a structured text. However, everything here is written in one paragraph, and there is no division by the number of hours, what exactly is studied in each module, checklist questions, etc. It is worth dividing the text into the main sections, because it is difficult for users (students) to navigate and immediately find the necessary material.

Syllabus finder (https://www.syllabusfinder.com/schools/york-university) – WEB resource for quick search of syllabus for discipline, designed by York University (Fig.3).
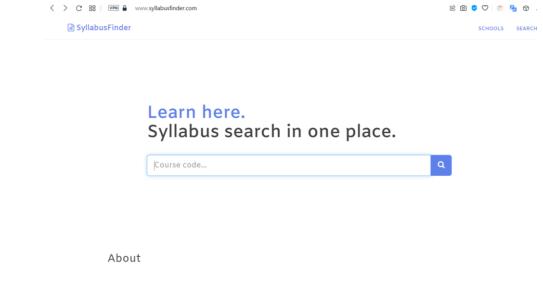

Figure 3. Syllabus finder explorer

The main disadvantage of this site is that it is impossible to search for a syllabus by name, by university, by teacher, but you can only find a course by entering the course code. But, not all students remember all the course codes, so it is not convenient. This can only be used by the teacher, knowing exactly the code of his course. It is worth adding more search criteria for people who are interested in this site, but do not know the basic search parameters.

National University of Kyiv-Mohyla Academy (https://www.ukma.edu.ua) WEB resource for syllabus represents on following page (Fig.4):

Figure 4. https://www.ukma.edu.ua/index.php/aspirantura/
370-sylabusy-kursiv/4524-sylabusy-kursiv-menedzhement

This site does not implement a convenient search for the course, specialty, teacher. There is no sorting by semester or specialty. Navigating the site is not convenient enough, but the site is not very convenient for reading. Already a very outdated site, not convenient placement of links to other information.

Stanford University Syllabus (https://syllabus.stanford.edu/syllabus/#/main-Syllabus) – WEB-resource for quick syllabus search by academic term and particular subject. This mechanism works only for registered students (Fig.5).
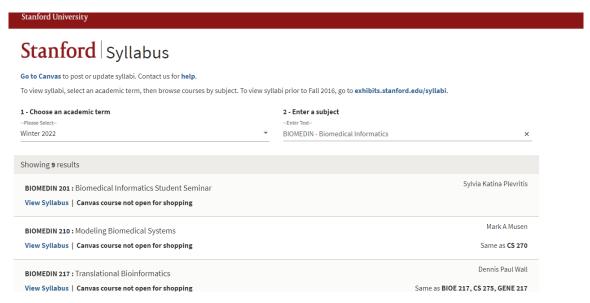
Figure 5. Stanford University Syllabus explorer

In this example, a more convenient interface to the design that corresponds to the style of this university has already been implemented. You can also see the search by year and specialty.

But the functions for all the people who do not study there are complete, that is, it is not possible to find out any information. Also, the search takes quite a long time with the reload of the page.

Statement of a problem

1. The article clarifies the problems of storage and curricula monitoring of the department with the reflection of syllabi.

2. Syllabuses should be well structured, informative and rather short. As soon as the teacher begins to use a deeply scientific language in compiling the document, the syllabus loses its informativeness and becomes only reporting.

3. Syllabi should be standardized and divided into very particular parts, which should also include relationships with other disciplines.

4. Analysis of sites that contain training programs and problems solutions and shortcomings of these sites for future improvement of our Web-application.

5. Popularization of this application among students and teachers to simplify the organization of independent educational and cognitive activities within the discipline being studied.

Method of displaying curriculums with additional information for each discipline

Today any department has many files for each course which are called curricula. These files contain a lot of information devoted to the educational process – disciplines,

educational levels, educational forms, educational cycles etc. One of these files displayed on the next figure (Fig.6):
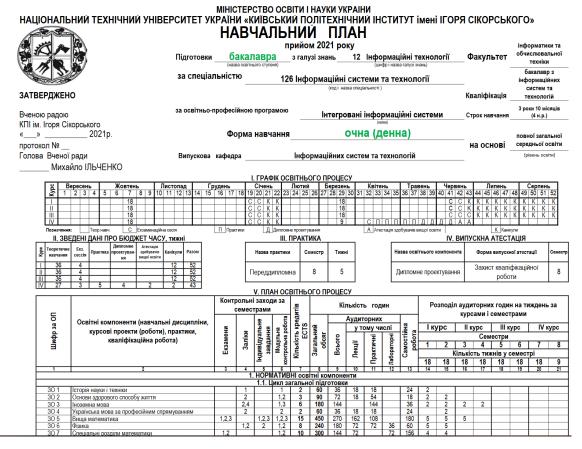

Figure 6. Curriculum for 1 course of Bachelor level, Full-time form, Integrated information systems educational program 126 specialty

All parameters, that placed on the top of the document can be used for search in WEB-application and table with disciplines can be displayed as convenient diagram. One of the ways to display view parameter is shown on the next figure (Fig.7):
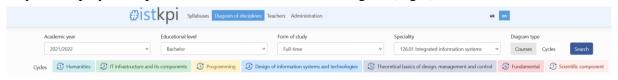

Figure 7. Minimum parameters for build curriculum diagram

The application allows you to get diagrams of disciplines by courses and semesters or cycles of training. It is possible to view the disciplines for the selected cycle of training, where you can see in which course each discipline of the cycle is studied. Thus, the user can build the diagram himself according to the necessary parameters.

For example, based on parameters values, that can be chosen using such mechanism, diagram for all courses and semesters with disciplines can be built (Fig. 8):

Figure 8. Example of two semesters for Bachelor level, Full-time form,
Integrated information systems educational program 126 specialty

Full view of discipline diagram in WEB-application "IST Syllabi" is shown on the next figure (Fig.9):
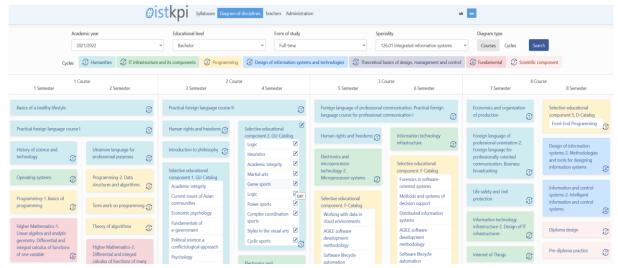

Figure 9. Full example for Bachelor level, Full-time form,
Integrated information systems educational program 126 specialty

Method of displaying curriculums based on all documents for each level (Bachelor, Master of science, Master of profession, PhD) and uses SQL query mechanism with parameters, that you can see on the top of diagram.

All data stores in MySQL relational database management system. Combine with such ORM (object-relational mapping) like Entity framework, WEB application "IST syllabi" was built on ASP .NET technology. Front-end of this application is based on Bootstrap – HTML, CSS and JS framework.

The design of this diagram was made using experience of many teachers and students to provide convenient view for educational year in complex.

For each discipline we have the possibility to add syllabus – details of educational process for discipline in each year.

Discipline's diagram also has tips for each item in curriculums. Tip represents basic information of discipline (Fig.10):
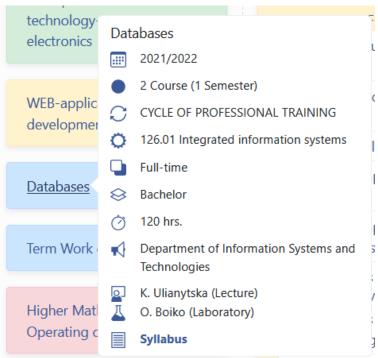

Figure 10. Basic information of "Databases" discipline

All information was loaded from the current year curriculum.

WEB application "IST syllabi" provides the opportunity to search for syllabi by the following parameters (Fig.11):

Academic year

Educational level

Speciality/Educational program

Form of study

Course

Discipline

Teacher.

In general, the list of all syllabi is displayed in the form of a table with fields: specialty/educational program, form of study, discipline, training cycle, credits, syllabus. It is possible to sort by each field. The user can view detailed information on the discipline in the form of a hint or jump to the selected discipline, open the syllabus.
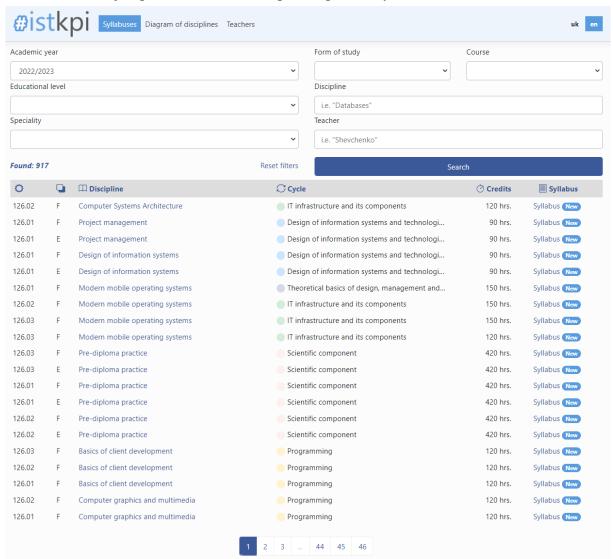

Figure 11. Search for syllabi by the parameters

There is an opportunity to view the disciplines and syllabi of a particular teacher (Fig.12).

The Teachers page displays a list of all teachers. To simplify the search for a teacher, the ability to view teachers alphabetically has been implemented. After choosing a teacher, the user receives information about the teacher's disciplines, grouped by academic year

(curriculum). The user can choose a discipline and view information about discipline in a convenient form: academic year, specialty/educational program, form of study, course/semester, number of credits, syllabus.
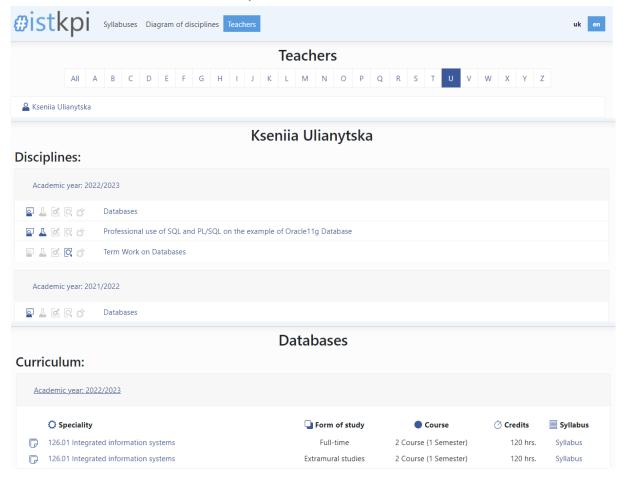

Figure 12. Disciplines and syllabi of the teacher

WEB application "IST syllabi" has administrative part, that contains mechanism for adding information from curricula.

Dictionary information for WEB application "IST syllabi":

- Academic years
- Specialties
- Levels
- Forms
- Teachers
- Departments
- Disciplines
- Cycles

Working information for WEB application "IST syllabi"

- Syllabi – forms to add syllabus in markdown notation.

- Curriculum Links – links between disciplines in each academic year in particular.

- Curriculum Teachers – links between teachers and their disciplines in each academic year in particular.

- Curriculums.

Each syllabus displays as WIKI-document based on Markdown notation. Syllabus should be written as text document in particular format or notation. In our case it is Markdown as it is very easy to transform text into referenced document. Example of Markdown notation, written for WEB-site on Ukrainian is shown on Fig. 13.

```
1   # Комп'ютерна графіка та мультимедіа – Робоча програма навчальної дисципліни (Силабус)
2   ## Реквізити навчальної дисципліни
3   |||
4   |-|-|
5   | Рівень вищої освіти | Перший (бакалаврський) |
6   | Галузь знань | 12 Інформаційні технології |
7   | Спеціальність | 126 Інформаційні системи та технології |
8   | Освітня програма | Інтегровані інформаційні системи, Інформаційні управляючі системи та технології, Інфор
9   | Статус дисципліни | Вибіркова |
10  | Форма навчання | очна(денна)/дистанційна |
11  | Рік підготовки, семестр | 2 курс, весняний семестр |
12  | Обсяг дисципліни | 120 годин (денна: 36 годин – лекції, 18 годин – лабораторні, 66 годин – СРС |
13  | Семестровий контроль/ контрольні заходи | Залік/залікова робота |
14  | Розклад занять | http://rozklad.kpi.ua |
15  | Мова викладання | Українська |
16  | Інформація про керівника курсу / викладачів | Лектор, лабораторні: ст. викладач Хмелюк Марина Сергіївна u
17  | Розміщення курсу | https://campus.kpi.ua |
18
19  ## Програма навчальної дисципліни
20  ### Опис навчальної дисципліни, її мета, предмет вивчання та результати навчання
21  #### Опис дисципліни
22  При проходженні даної дисципліни, студенти навчаться проводити аналіз та обирати відповідні до поставленої
23
24  #### Предмет навчальної дисципліни
25  ометоди представлення графічний об'єктів, колірні моделі, двовимірні перетворення, тривимиріні перетворення
26
27  #### Міждисциплінарні зв'язки
28  Дисципліна Комп'ютерна графіка та мультимедіа базується на дисциплінах: Вища математика, Програмування – 1.
29
30  #### Мета навчальної дисципліни
31  Підготовка висококваліфікованих фахівців, які будуть володіти знаннями створення графічних об'єктів, викори
32
33  #### Основні завдання навчальної дисципліни
34  ##### Знання
35  •   основних понять комп'ютерної графіки;
36      методів подання кольорів, колірних моделей;
```

Figure 13. Markdown notation for syllabus WIKI-document

Based on Markdown and using typical transformation to referenced document, WEB-site can now show syllabus with modern view with quick search and transparent guide. On Fig. 14 is shown example of such WIKI-document with referenced and clickable content and text inside.

The left side of this document is referenced content and inside of text it could be found reference to related discipline in curricula for current syllabus (Fig. 15).

The main issue, that we have today is the clarification of discipline and curricula content for students and teachers, cause every discipline has relations with another disciplines in its area and it needs to be clearly and simple description with quick view and availability in any time. Presented WEB-site shows exactly this solution – implemented into the department's WEB-site syllabus management system helps all to get clearly information about curricula and discipline in a few seconds.
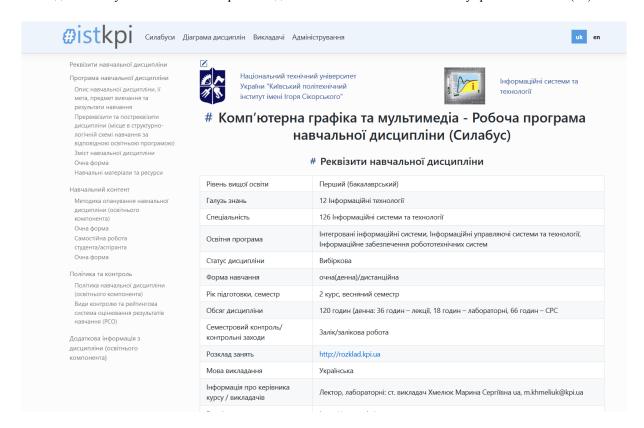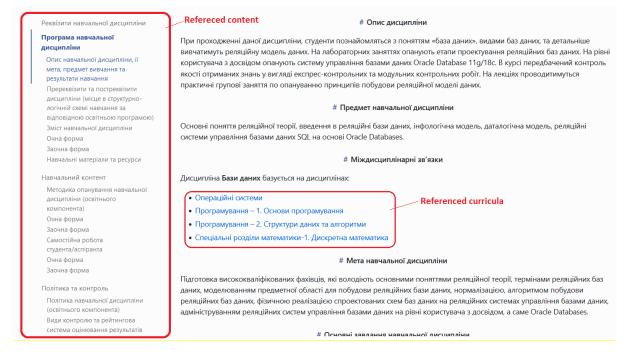
Figure 14. Example of WIKI-document for syllabus

Figure 15. Referenced content and curricula for syllabus

Conclusions

Overall, the main objective of this study is to identify and improve usability of discipline syllabuses – make them clear for search, monitoring, and fully meet curricula. In this paper is shown method to make flexible relations between curricula unit (discipline for each semester, year, specialty etc.) and syllabi themselves. This research might be the beginning for the development of the Syllabus Management System for the university department or educational unit in general.

Using ontology as guidance in structuring the system allows the opportunities to expand and reuse the system for other programs offered in KPI.

Besides that, with the assistance of ontology tools, it helps the system to manage, distribute, capture and represent the knowledge base of the syllabi and the future Outcome Based Learning activities.

REFERENCES

1. Rendong Jin "Curriculum Management Study: Origin, Development, Current Situation and Trend". 5th International Conference on Social Science and Higher Education (ICSSHE 19): pp. 958-961.

2. Augustine, GM; Mckiniey, MM; Galster, M D. "Developing criteria for institution management curricula". Journal of the American Dietetic Association, 1954, 30(5): pp. 458-63.

3. Anushia Chelvarayan, Chandrika Mohd Jayothisa, Hazlaili Hashim, Khairol Nizat Lajis. Syllabus Management System for Academics Practicing Knowledge Management / IBIMA Publishing. - Journal of Organizational Knowledge Management. 11 p.

4. Abel, M., Benayache, A., Lenne, D., Moulin, C., Barry, C., & Chaput, B. (2004), "Ontology-based Organizational Memory for E-learning," Educational Technology & Society, Vol. 7 (4), pp. 98-111.

5. Civi, E. (2000). 'Knowledge Management as a Competitive Asset: A Review Marketing Intelligence and Planning,' Journal of Knowledge Management, 18 (4), pp. 166-174.

6. Hafferty, F W "Beyond. curriculum reform: Confronting medicine's hidden curriculum" .Academic Medicine, 1998, 73 (4): pp. 403-407.

7. Stevens, D. L.; King, D.; Laponis, R. "Medical students retain pain assessment and management (PAM) skills long after an experiential curriculum: A controlled study". Journal of General Internal Medicine, 2007, 22 (1): p. 88.