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Proposal for an alternate structure to organize and access resources in a virtual library in education

Abstract: Description of the stages of development of a faceted classification structure usable to organize and access a virtual collection of specialized web resources in the field of education. Comments on the results of a first application of the newly established structure.

Résumé : Présentation des étapes de développement d'une structure classificatoire à facettes utilisable pour l'organisation et l'accès à une collection virtuelle de ressources du web spécialisées dans le domaine de l'éducation. Commentaires sur les résultats d'une première utilisation de la structure à facettes nouvellement établie.

1. Introduction

Specialists and researchers in education can find on the web considerable amounts of education-related information. Web resources in education may be accessed via general directories (*La Toile du Québec*, *Yahoo!*, etc.) or through special virtual libraries hosting systematically organized collections of live links to selected resources (Hudon 2003).

In the framework of a three-year project funded by the Fond québécois pour la recherche sur la société et la culture (FQRSC)[1], we first analyzed *ad hoc* classification structures developed for organizing and accessing virtual collections in the field of education. Our sample consisted of six web-based libraries, all accessible in English only, and the analysis considered three dimensions: structure, logic, and semantics. Results confirmed that the hierarchical model based on contextual rather than hyperonymic relations remained the most popular, and that the classification structures were not overly complex and not very specific. Choice, arrangement and sequence of classes within the structures appeared logic enough to make them easy to apprehend and navigate. But we observed that the structures were not very flexible and did not appear to benefit much from the technological environment in which they had developed and were now applied. Complete description of the methodology and presentation of main results and interpretations have been published in (Hudon, Mas and Gazo 2005) and (Hudon and Mas 2006).

Among the six structures that were examined, two appeared closer to an alternate model for organizing objects, subjects, and classes; *Education Index* (www.educationindex.com) and *Education Virtual Library* (www.csu.edu.au/education/library.html) made use of explicit facets. However, these two structures were the least developed and the least balanced of all, and it was not possible to extrapolate on the usefulness of facets to structure and access virtual collections. It is this alternative faceted model that we have explored in the second part of our research project.

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1 Conception d'un schéma de classification pour l'organisation et le repérage des ressources du Web dans le domaine de l'éducation (2003-2006). We wish to acknowledge the significant contribution made by the four students who have worked on the project as research assistants. They are: Mesdames Pascale Bellemare, Dominique Gazo, Johanne Lavoie and Sabine Mas.

In this paper, we first describe the development stages of a faceted classification structure for a special virtual library of web resources in education. In the second part of the paper, we comment on the results of a first application of the newly established structure to describe and organize 408 web-based resources in our sample virtual library, and announce the next steps in the validation process.

At this time, the faceted structure exists only in its French version. Excerpts from the structure are shown in French only when appearing in tables or figures. Within the text, examples are provided in French, with a rough translation in English suggested in parentheses.

2. A faceted structure to organize and access resources in a virtual library in education

The use of faceted structures to organize and access specialized digital resources is not widespread, even if it is obvious that contemporary networks constitute an ideal environment for implementing the analytico-synthetic principles and practices suggested by S.R. Ranganathan in the 1930's. The facet is a characteristic, an indicator, a criterion that may be used to subdivide a class or a set of objects in homogeneous subsets. Age, gender, or address, for example, are facets that can be used to create subsets in a group of persons. The same facets can be used to identify more or less precisely each member of the original group: X is a women, belonging to the 30-39 age group, residing in the Montérégie administrative region of Québec, etc. A facet may be usable with any group of objects or subjects (for example: agent, process, property, method), or apply only to certain categories of concepts and objects or within a single discipline (for example: educational level, or source of financing, in education).

When a choice has been made to work with a faceted structure rather than with a strictly hierarchical one, classifying an information resource does not consist anymore in locating its main subject on a pre-established thematic map; rather, it requires a complete analysis of the subject using in turn all facets or perspectives from which it can be considered. The subject can then be represented very precisely. Intellectually, the faceted classification offers several benefits:

> 1. Starting with a much smaller number of distinct classes, it authorizes a much more refined representation of many subjects than enumerative classifications (such as the *Dewey Decimal Classification (DDC)* or the *Library of Congress Classification (LCC)*) do;

> 2. It is more flexible and adapts easily to conceptual evolution and renewal; it is always possible to modify isolates or values attached to a facet, or even to add a facet, without affecting in major ways the global structure of the system;

> 3. When explicit facets are used to organize and access subjects and collections, it becomes possible to optimize automated search strategies since a subject may then be retrieved from each one of the facets that has been used to describe it.

Several knowledge organization specialists have shown a definite interest in facets when discussing organization and access to web resources (Broughton 2002, Ellis and Vasconcelos 2000, LaBarre 2006). Van der Walt (2004) and Zins and Guttmann (2000) have designed faceted structures to describe and classify specific domains; we used these

structures as examples in designing our own proposal for an alternative to a strictly hierarchical structuring of virtual collections in education.

The proposed structure was developed in several stages, using a deductive approach strongly dependent on literary warrant: 1. creation of a sample virtual collection of web resources in education; 2. classification of each resource using a traditional classification scheme (*DDC*), as well as the structure used within *The Educator's Reference Desk* (www.eduref.org); 3. indexing of each resource using a traditional thesaurus: *EDUthès : Thésaurus de l'éducation* (http://www.cdc.qc.ca/eduthes.html), and design of a bank of candidate descriptors and potential isolates; 4. identification of structural facets needed for content analysis and representation; 5. design of the faceted structure.

2.1 Creating a special virtual collection of web resources in education
The identification of relevant facets in our chosen discipline, the development of a bank of descriptors, and the planned testing of the proposed classification structure made it necessary to establish a small virtual collection of web resources in education, which would contain a wide variety of contents and types of documents. It was decided that this sample virtual collection would contain French-language resources only.

Our virtual collection grew over a period of several weeks through exploration of the web with its main search engines, and by targeted inspection of sites created and maintained by Faculties of Education in Francophone universities or by government departments and agencies, as well as national and international associations and organizations with ties to education. Following links to related resources proposed by selected sites also proved productive.

Twenty-five themes or formal criteria that had been suggested by a survey a existing virtual libraries in education, by examining the detailed summary of the *Encyclopaedia of Educational Research*, as well as by a literature review on information needs and behaviour of researchers and professors of education served as departure points for exploring the web. Our objective of building a collection of 400 distinct resources was achieved at the price of long hours of wandering on networks, searching for document types and for contents not yet represented in our sample. We were ultimately able to work with a collection of 408 resources (or live links). Table 1 describes the content of this collection.

Theme	*N* resources	Theme	*N* resources
Legislation	68	Teaching	46
Research	44	Statistics	38
Theory and Theoreticians	36	System and Reform	26
Policy	21	Career	18
Equity and discrimination	13	Philosophy of Education	11
History of Education	9	Terminology	9
Publishing	9	Theses	8
Information management	7	General management	6
Associations	6	Economy of education	6
Psychology	6	Comparative education	5
Standards	4	Ethics	4
Unions and Labor issues	4	Legal aspects	3
Leadership	1	TOTAL	408

Table 1 *Contents of the sample virtual collection*

Our sample collection was composed of a good variety of document types, from portals to journal articles available in .pdf format, from catalogues and bibliographies to institutional web sites, from reference works to sponsored expert reports. A brief description of each resource was created at the time of selection: the description included minimally a significant title, a precise URL, an indication of source and provenance, and a statement as to availability of links to related resources (see Figure 1).

Digital collection development, itself a growing and active field of research, is of course far from easy, if only because of the difficulty of determining what exactly is considered to be a web document. At this stage of our project, we chose the most inclusive definition of the web document (web page, web sites, series, etc.) and did not concern ourselves with any potential value that could be assigned to these resources by an information specialist, to discriminate, for example, between a personal page and an institutional one. In the case of series (weekly, monthly, etc.), titles were included once only and the corresponding URL led to a resource bearing a specific date. It did not appear necessary, for the purpose of this project, to apply cataloging rules relating to title modifications, even if this may have led to the discovery of additional resources.

2.2 Classification and indexing

Each one of the 408 web resources selected for our sample collection was classified using the *Dewey Decimal Classification* (*DDC*) and the hierarchical structure developed in *The Educator's Reference Desk* (*ERD*). The choice of *DDC* was justified by the significant presence of this classification scheme in a wide variety of information environments (including the world wide web) and by our own observation of the semantic relevance of this structure for collections of resources in education (Hudon, Mas and Gazo 2005). *ERD* is the special virtual library whose access structure was considered the most efficient of all that were evaluated in the first part of our research project.

The main objective of the classification operation, at times very complex as one can imagine, was the identification of structural facets (Maniez 1999) applicable to the field of education; such process has been recommended by Vickery and the Classification Research Group (CRG) (1960). Furthermore, classification with these systems would later make possible a comparison of three quite different organizing and access structures, as to their efficiency.

Each resource was also assigned a set of descriptors proposed in *ÉDUthès : Thésaurus de l'éducation*. *ÉDUthès*, created and maintained in Québec, offers a list of close to 4 000 controlled terms describing major subject areas in the field.

Figure 1 shows a descriptive record following selection, description, classification and indexing.

Title	*L'équité des systèmes éducatifs européens: un ensemble d'indicateurs*
URL	http://europa.eu.int/comm/education/programmes/socrates/observation/equality_fr.pdf
Theme	Questions éthiques ?
Source	Groupe européen de recherche sur l'équité des systèmes éducatifs / Projet soutenu par la Commission européenne, Direction générale de l'éducation et la culture
Document type	Document textuel
Links	Non
DDC	370.94 Education—Geographical treatment—Europe 379.26 Educational equalization (Equal educational opportunity)
ERD	General Education–Comparative Education / Educational Management–No Child Left Behind
ÉDUthès	Éducation comparée / Système scolaire / Indicateur social / Indicateur économique / Indicateur de rendement / Différences sociales / Égalité en éducation
Abstract	Rapport final explorant les divers facteurs de l'inégalité en éducation en les traduisant en indicateurs (motivation, inégalité sociale, différence culturelle …)

Figure 1. *Example of a descriptive record*

Once the tasks of classification and indexing had been completed, we had at our disposal a reservoir of descriptors which could later be used as precise values, or isolates, in the faceted structure under development.

2.3 Development of a faceted classification structure
We chose to create a faceted structure rather than a traditional, strictly hierarchical one, because of the representational flexibility made possible by the use of facets. As our structure was expanding, we kept in mind and defined our objectives in accordance with desirable characteristics of a classification scheme used with digital resources: simplicity, logic, flexibility, hospitality, authority and specificity (Molholt 1995).

2.3.1 Choosing facets
The information acquired during previous stages of our research project, as well as the set of titles and descriptors that were already available allowed us to suggest that five generic facets were needed to describe, structure and access a virtual collection of resources in education. These facets are: AGENT (who?), ACTIVITY or process (what?), METHOD or tool (how?), SPACE or context (where?) and TIME (when?). In order to describe and access documents offering more general information, not linked directly to any of the preceding questions, a supplementary facet, FOUNDATIONS, was added, as proposed in the model described by Zins and Guttmann (2000). The document type facet was excluded from the structure; we consider that this information is of a descriptive cataloguing nature and believe that, if it became necessary, a straight list of document formats could be offered to the information searcher wanting to use this criterion to restrict and filter a set of retrieved resources.

The proposed classification structure was developed using, as often as it was possible to do so, a principle of division by essential characteristic rather than the principle of

contextual hierarchy which is applied to most contemporary classification structures. In education, there exist two types of AGENTS: Persons/Individuals and Organizations; subsets of persons may be created on the basis of gender, age, and role or function. Teaching, an ACTIVITY, can be described from the perspective of target clientele (<clientele>), of objectives (<goals and objectives>), of level (<educational level>), of the subject being taught (<discipline/subject>), of the method used to do so (<method>).

It was obviously not always possible to respect the principle of division by essential characteristic, and we were sometimes forced to resort instead to a more traditional thematic division, even at the highest levels within the structure. This was the case for the FOUNDATIONS facet (Table 2).

	Éducation (Généralités)
FONDEMENTS	Histoire de l'éducation
	Philosophie de l'éducation
	Théorie de l'éducation

Table 2 *First level of division in the FOUNDATIONS facet*

To preserve its ease of access and user-friendliness, it was decided that the structure would not develop beyond the fifth level of subdivision, that the total number of isolates could not be larger than 400, and that the number of isolates at the deepest level of the structure would be as balanced as possible. Everywhere, except for the top facets, alphabetical order was preferred to systematic order of classes.

2.3.2 Naming classes and choosing isolates
Each distinct class of a faceted structure has a specific name and is referred to as "isolate". Names are normally those that are found most frequently in the literature of a discipline and in its major reference sources. Our bank of potential isolates was established on the basis of keywords and terms used in the titles and summaries of resources in our virtual collection, of terms found in corresponding captions in the *DDC,* of terms used in *ERD* where the first three levels of the hierarchy had been translated in French by a member of our team, and finally of *EDUthès* descriptors. We must specify that semantic control of terms appearing in our faceted structure is minimal; the chosen term is the most current, the simplest in form, and the most accessible; grammatical gender and number have been standardized, but equivalence with synonyms, homonyms or homographs has not been documented. Control of the phenomenon of conceptual equivalence could be achieved in an index, but could not be made explicit within the structure itself without decreasing its ease of use and user-friendliness. Since the classification structure should normally be used by researchers and specialists of the discipline, we believe that the lack of complete semantic control (as would be found, for example, in a traditional thesaurus) should not be a source of major problems.

Table 3 expands the Teaching class of the ACTIVITY facet, and lists a series of isolates appearing at the fourth level of the structure.

Enseignement	selon la clientèle	Enseignement aux adultes
		Enseignement aux immigrants
		Enseignement aux personnes ayant un handicap
	selon la discipline	Enseignement de l'administration
		Enseignement des arts et lettres
		Enseignement des langues
		Enseignement des mathématiques
		Enseignement des sciences appliquées
		Enseignement des sc. de l'éducation
		Enseignement des sc. de la nature
		Enseignement des sc. de la vie
		Enseignement des sc. humaines et sociales
	selon la finalité	Alphabétisation
		Éducation civique
		Éducation sociale
		Formation de base
		Formation continue
		Formation diplômante
		Formation professionnelle
		Formation technique
	selon la méthode	Enseignement à distance
		Enseignement correctif
		Enseignement en équipe
		Enseignement holistique
		Enseignement magistral
		Enseignement par immersion
	selon le niveau	Enseignement préscolaire
		Enseignement primaire
		Enseignement secondaire
		Enseignement postsecondaire

Table 3. *Expansion of the Teaching class in the ACTIVITY facet*

One will note that the classes thus created, whose name often results from a process of pre-coordinating concepts of different nature (as in Enseignement + Personnes ayant un handicap [Teaching + Handicapped persons] or Enseignement + Sciences humaines et sociales [Teaching + Humanities and Social sciences]), are not mutually exclusive. Assignment of a resource to multiple classes must then be not only authorized but also strongly recommended, so that numerous access paths to a relevant resource are created. It should also be noted that the lists of isolates are far from exhaustive; in a faceted structure, this is not a problem since the structure itself allows for new subjects or set of subjects, expressed in the form of isolates, to be added without making it necessary to review what has already been established and validated.

At the time of planning a first application of the newly developed structure to describe and organize our virtual collection of 408 resources, the structure was composed of:

- 6 top level facets representing as many departure points for navigating toward specific subjects;

- 25 second-level classes, 16 of which are not an expression of a principle of division and can be used to describe resources (for example: ACTIVITÉ ►Communication [ACTIVITY ►Communication]);

- 86 third-level classes, 70 of which are not an expression of a principle of division and can be used to describe resources (for example: TEMPS ► *temps socio-culturel* ►Année scolaire [TIME ►*«socio-cultural time»* ►School year]);

- 142 classes at the fourth-level, among which two are expressions of a principle of division and cannot be used to describe resources (for example: MILIEU ►Milieu institutionnel ►Établissement d'enseignement ►*selon le niveau d'enseignement* [SPACE ►Institutional space ►Teaching institutions ►*«by level»*]);

- 62 classes at the fifth and deepest level of the structure, all usable to describe resources (for example: AGENT ►*Personnes* ►*selon le rôle ou la fonction* ►Administrateur ►Registraire [AGENT ►*«persons»* ►*«by role or function»* ►Administrator ►Registrar]).

Two hundred and eighty-eight (288) isolates, judged of interest to researchers and specialists of education, were available in the structure that was used to organize the resources of the virtual sample collection.

2.4 Using the faceted structure

The developing faceted structure was used to describe and organize the 408 specialized resources in our sample virtual collection in education. Although the lack of the most appropriate technological interface did not allow for optimal exploitation of the structure, it is possible for us to comment at this time on extension and conceptual coverage, navigational logic, flexibility, extensibility and structural hospitality. Our perspective is that of the classifier using the structure to describe and organize a collection; in a later stage of this research, the structure will also be used by information searchers to access the sample collection.

2.4.1 Extension and conceptual coverage

As would be the case in any indexing and retrieval language constructed *a posteriori* to organize and access an actual collection, conceptual coverage in our faceted structure is necessarily oriented and limited by the contents of the sample collection. We had estimated that 400 isolates would be necessary to describe and organize a basic collection destined to be used by education specialists; this number was not reached. The characteristics of extensibility and structural hospitality of faceted structures should permit, however, systematic expansion of the structure to parallel that of the collection, and ultimately that of the field.

2.4.2 Navigational logic

To make it easier to navigate the structure, the number of top and lower level facets allowing for its expansion was deliberately restricted. When the principle of division by essential characteristic was not anymore applicable, generic hierarchy came into play to permit the development of deeper structural levels (Table 4).

AGENTS ►*Personnes* ►*selon le rôle ou la fonction* ►Personnel enseignant ►Maître de conférence		
ACTIVITÉ ►Enseignement/Formation ►*selon le niveau* ►Enseignement postsecondaire ►Enseignement universitaire		
ACTIVITÉ ►Recherche ►*selon la méthode* ►Recherche qualitative		
MILIEU ►Milieu institutionnel ►Établissement d'enseignement ►*selon la source de financement* ►Établissement privé		
MILIEU ►Milieu institutionnel ►Établissement d'enseignement ►*selon le niveau d'enseignement* ►École secondaire		
MOYEN ►*pour l'enseignement et l'apprentissage* ►Technologie éducative ►Technologie multimédia		

Table 4. **A**pplication of the principle of division by essential characteristic, supplemented by that of generic hierarchy

To preserve user-friendliness, alphabetical order was applied at all levels of the structure but the top one.

2.4.3 Flexibility

Flexibility may be assessed from two distinct perspectives; flexibility relates to contents, and flexibility also relates to usage, recommended and actual.

Simplicity and ease of navigation were primary objectives in this exercise. To attain these goals, redundancy in contents was deemed necessary. Such redundancy allows an isolate, for example Normes [Standards], to appear in various places within the structure, possibly even under different top level facets, within contexts that will provide the represented concept with various, but always appropriate meanings (Table 5)

MOYEN	*pour l'évaluation*	Normes
	pour la gestion	Normes
	pour la recherche	Normes

Table 5. *Example of redundancy by reuse of an isolate in various contexts*

It is in the expansion of the facet METHOD or tool that the largest number of cases of redundancy by reuse of the same isolate in various contexts will be found.

Redundancy is also observed in class names, as in Étudiant ►Étudiant ayant des difficultés d'apprentissage [Student ► Student with learning disabilities], or in Enseignement ►*selon le niveau* ►Enseignement postsecondaire ►Enseignement universitaire [Teaching ►«*by level*» ►Postsecondary teaching ►University teaching]. This second type of redundancy, which we will call lexical redundancy, allows for recognition of the meaning given to an isolate, even when it is first seen outside of its structural and navigational context (in an alphabetical index for example).

The flexibility of the faceted structure is also a factor of its use, not only for organizing resources in homogeneous and relevant groupings, but also for describing each resource present in a collection. The process of classifying using a faceted structure is very similar to that of indexing the contents of a resource. Working with a faceted structure, the classifier cannot simply assign a resource to the more or less conceptually complex class to which its main subject belong, this class being identified on the document itself by some symbol. Rather, the classifier must assign a resource to multiple conceptually simple classes to reflect all facets of the subject. Table 6 provides examples of multiple allocations of sample resources to various facets and classes within.

Title	Classification
AFIRSE : Association francophone internationale de recherche scientifique en éducation	FONDEMENTS ►Théorie de l'éducation ►Apports disciplinaires AGENT ►Organisme ►Association ►Association savante ACTIVITÉ ►Recherche ACTIVITÉ ►Communication
John Locke (1632-1704) Quelques pensées sur l'éducation	FONDEMENTS ►Philosophie de l'éducation FONDEMENTS ►Théorie de l'éducation ACTIVITÉ ►Enseignement/Formation ►*selon la finalité* ►Éducation civique MILIEU ►Milieu géopolitique ►Europe ►Angleterre TEMPS ►Temps chronologique ►Avant le 19e siècle
Programme de formation de l'école québécoise : éducation préscolaire, enseignement primaire et secondaire	AGENT ►Organismes ►Ministère / Organisme / Agence gouvernementaux ►Ministère de l'éducation ACTIVITÉ ►Enseignement/Formation ►*selon le niveau* ►Enseignement primaire ACTIVITÉ ►Enseignement/Formation ►*selon le niveau* ►Enseignement secondaire MOYEN ►*pour la gestion* ►Programme MILIEU ►Milieu géopolitique ►Amérique du Nord ►Canada ►Québec
Microsoft Education	AGENT ►Organismes ►Organisme non gouvernemental/commercial MOYEN ►pour l'enseignement et l'apprentissage ►Technologie éducative ►Technologie informatique MILIEU ►Milieu géopolitique ►Europe ►France
Système d'information sur la recherche universitaire	AGENT ►Personnes ►*selon le rôle ou la fonction* ►Chercheur AGENT ►Personnes ►*selon le rôle ou la fonction* ►Personnel enseignant MILIEU ►Milieu institutionnel ►Établissement d'enseignement ►*selon le niveau* ►Université ACTIVITÉ ►Recherche MOYEN ►*pour la recherche* ►Subvention de recherche MOYEN ►pour la recherche ►Contrat de recherche MILIEU ►Milieu géopolitique ►Amérique du Nord ►Canada ►Québec
En quoi les TIC changent-elles les pratiques d'ingénierie pédagogique du professeur d'université?	FONDEMENTS ►Théorie de l'éducation ►Pédagogie AGENT ►Personnes ►*selon le rôle ou la fonction* ►Personnel enseignant ACTIVITÉ ►Enseignement/Formation ►*selon le niveau* ►Enseignement postsecondaire ►Enseignement universitaire MILIEU ►Milieu institutionnel ►Établissement d'enseignement ►*selon le niveau* ►Université MOYEN ►*pour l'enseignement et l'apprentissage* ►Technologie éducative MILIEU ►Milieu géopolitique ►Amérique du Nord ►Canada ►Québec

Tableau 6. *Examples of application of the faceted structure*

These multiple allocations represent as many distinct ways to logically navigate toward the set of relevant resources needed to fill a need or satisfy an interest. The process will be even more efficient if the interface and search engine authorize simple combinations of facets and values of the type: AGENT + ACTIVITY + SPACE + METHOD as in: Personnel enseignant + Enseignement en équipe + École secondaire + Technologie éducative [Teaching personnel + Team teaching + Secondary school + Educational technology], or complex combinations of the same. In the latter case, several isolates linked to the same facet are related to one another using suggested pre-defined formulas, or formulas created by the information searcher when the need arises as in : {Directeur + Directeur adjoint + Registraire} + {École secondaire + Établissement public} + Communication [{Director + Assistant director + Registrar} + {Secondary school + Public institution} + Communication]).

2.4.4 Extensibility and structural hospitality

The first application of the proposed faceted structure to describe and organize our sample virtual collection has already led to the integration of specific isolates and of facets allowing for a supplementary level of subdivision, as well as forced the restructuring of some sections of the structure to improve its navigational logic. It is thus possible at this time to confirm the extensibility and hospitality of the proposed structure.

By nature, a faceted structure can be extended at any and all of its levels. It is of course always tempting to add large number of isolates at the lowest and deepest levels, but this is not necessarily in the best interest of the information searcher who is then at risk of being offered unsatisfactory retrieval sets due to the small number of relevant resources they contain. The main objective of any classification structure remains the grouping of resources linked through their thematic content, their genre, their format, etc., rather than discovery of one or two relevant resources, already made possible by other search methods and strategies, the keyword-based search for example.

The faceted structure is also characterized by its hospitality. The integration of new isolates at the exact place in the structure where they are needed, and within the context that will give them their full meaning, is always possible without modification to the macrostructure itself. Integration of facets expressing a division on the basis of essential characteristic (<*according to …*>, <*by…*>, <*on the basis of...*>) will necessarily bring about the restructuring of sections of the structure, since a list of isolates, till then presented in alphabetical order, will need to be systematically reorganized on the basis of the new point of view. Numerous structural changes are expected during the initial development phases, but when the structure is not complex and not very deep, the frequency of such adjustments will diminish as the bases of the structure settle.

2.5 Next steps
Our work on an alternate structure usable to organize and access a collection of specialized web resources in the field of education is now entering a phase of multiple validations.

Even if we have, on occasions, solicited the expertise of education specialists in the course of developing this proposal for a faceted classification structure, we have until now relied mostly on the content of our virtual collection and on the structures proposed by reference works to name, rank, and structure facets and concepts. A more scientific process of validation is now required; this validation will be sought from researchers in

education, primary target users of a virtual library of French resources in this field; a large majority of education specialists surveyed at an early stage of this project have confirmed their interest in such an information source.

Validation of the ease of navigation, user-friendliness, extensibility and flexibility of the structure will be obtained by having two or more classifiers, who have not had until now any ties with this project or with the project team, use the faceted structure to describe the resources of our sample virtual library. A second application of the structure is already under way.

The third and last validation process will only be launched when an appropriate technological interface allowing for optimal use of the structure to identify and locate relevant resources becomes available. This validation will be done within a controlled experimental environment, by exploiting the structure to access and retrieve relevant resources. Education and information specialists will be asked to complete more or less complex search tasks; this will allow us to validate the proposed content, as well as compare the performance and efficiency of the alternate structure with that of *DDC* and of *ERD*.

3 Conclusion

This three-year research project has led us first to confirm that the organization of web resources in virtual libraries has improved considerably over the past 15 years. Whether universal or specialized in their coverage, the « new » classification structures are user-friendly and truly accessible to information searchers, but they remain rather inflexible and from a logical point of view, still leave much to be desired.

We now have the technology that should allow us to implement principles of analysis and representation proposed in the first half of the XXth century by the Indian librarian Ranganathan, and to develop and use classificatory structures that are flexible, hospitable and better adapted to the electronic networked environment.

It is in this stream of thinking that we propose an alternative to the strictly hierarchical organization of sets of specialized web resources, with a view to facilitating access and retrieval. The development of a generic structure based on facets for organizing and accessing web resources of interest to specialists and researchers in education has allowed us to present the interest of this solution for the classifier. The faceted structure is still developing, and various validation processes are, or will soon be in place. We hope to be able to also confirm in the near future the interest of the solution for the web searcher.

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