Curriculum Design in Information Science: The University of Chihuahua (Mexico) Case

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ABSTRACT

This paper, includes the results of a research that served like a support to develop curriculum design in the undergraduate program in library and information science into the University of Chihuahua (México). The discoveries, basically are integrated in two sections; the first one, focused in the data collection taking as a reference opinions from candidates, students, experts and market labor, as well as, other universities with same study programs; the second perspective, include the decisions made by the faculty that actually is working in the study program taking like reference the date analysis and in consequence, offering the creation of a new proposal in library and information science. The results was approved for the faculty same and the university committee, offering now, an educational alternative for the Northern of Mexico. Finally, the paper include a conclusions and it is completed with a bibliography that served to support the project development.

CURRICULUM DESIGN IN INFORMATION SCIENCE: THE UNIVERSITY OF CHIHUAHUA (MEXICO) CASE

During the process of selecting the topic for this research paper, we always thought of the possibility of working on an aspect related to our previous work experience and that could, at the same time, provoke an important impact in an educational organization. According to Block (2001) and Cummings (2001), knowing the methodology that is followed when developing a consulting process or having great skills in interpersonal relations is not enough, but it is very important to demonstrate a deep knowledge in the topic that is being studied. So, knowing the present financing needs to work toward the process of change that public universities have, we decided to study and analyze the situation introduced in the following description.

DESCRIPTION OF THE SITUATION

The University of Chihuahua is a public institution that offers 35 undergraduate programs and 38 graduate (M.D. and Ph. D.) programs in an array of disciplines. It serves about 15,000 students in three campuses. According to ANUIES (National Association of Universities and Institutions of Higher Education)(1999), the academic model that this institution has is the so called Classical or Napoleonic, since it is formed by independent schools that offer their own academic programs and have their own administration and professors, but are ruled by a central committee.

For this research paper, it is important to emphasize the particular situation of the School of Philosophy and Letters, specifically the academic program of Information Sciences, which "...serves 220 students studying in different semesters, has 8 full-time professors and 15 part-time professors who work in other organizations..." (Tarango, 2002, p. 13). The program of Information Sciences is only offered in the Chihuahua Campus and it has a great acceptance by prospective students wishing to be admitted into the program.

Due to the complicated situation studied here, it is important to describe the origins and the evolution of this program. The origins of this program can be summarized as follows:

1. In 1989, the administration of University of Chihuahua considered that it was necessary that some of its schools increased their enrollment. The School of Philosophy and Letters was in this situation, since the disciplines in Humanities had a small population and the facilities were not being used. At that time, the school offered only three B.A. programs: Hispanic Letters, English, and Philosophy and the M.D. program in Higher Education. At that moment, the best option was to establish new educational programs to increase the number of students.
2. The immediate solution was to offer a new academic program: Bachelor's Degree in Communication Sciences, since this discipline is widely accepted in Mexico because of the number of students who want to be accepted in this program. The School designed a new curriculum trying to offer a heavy load of philosophy related subjects and a lighter load of subjects focused on mass media.
3. The new curriculum was accepted by the Academic Council and the other authorities of the university, but in a short time, these same authorities decided that opening this program was not pertinent since this university was already offering Communication Sciences in Ciudad Juarez, a large city located in the northern part of the State of Chihuahua. This program had the same name, but offered different subjects, more technology, and a body of professors with degrees and experience in the area.
4. Due to the situation described above, the School of Philosophy and Letters suggested a change in the name of the new program: Communication Sciences would become Information Sciences. The proposal was accepted by the authorities, so the new program was opened and the number of students increased.
5. The new Information Sciences program, with only two information sciences–related subjects: Information Theory and Introduction to Information

Sciences, began in 1990. The graduate profile indicated that graduates were formed with the skills to face mass media with a focus on humanities.

6. Various studies by professors, confusion by students and demands of graduates led to the discovery of the great difference that existed between Information and Communication Sciences. During this time, the School of Philosophy and Letters immediately thought about changing the curriculum of this program, but since this process was time consuming, the immediate solution was to offer elective subjects related to Information Sciences and to add the following to the graduate profile: "... (the graduate) describes, classifies, indexes and files documents and data bases in all of their formats... (Facultad de Filosofía y Letras, 1995, p.2).
7. The situation became worse since the students had the choice to study Information Sciences with a minor on mass media or library science. Both profiles were working with many weaknesses due to the lack of professors with experience in the discipline. From these problems, the principal of the school suggested a committee be formed to begin the process of redesigning a new curriculum.
8. The committee worked for about two years, but the results were not significant, since the members of this committee had not studied information sciences and their contributions did not offer good solutions. The committee finally decided to include an internal counselor to coordinate the future steps.

According to the previous description, it is necessary to consider a radical change in the curriculum of information sciences for these reasons:

1. The present curriculum is focused on mass media, which is inappropriate.
2. Areas like library science, documentation, information administration, files and registers, among others, must be included in the curriculum.
3. The policies of public schools in Mexico demand a curriculum change every five years (Ministry of Education in Mexico, 1999). This study program has been obsolete for 12 years.

4. Some professors of the school react against this change in the curriculum since they fear losing their job.

As a result, an important curriculum redesign was required immediately and it was necessary to convince faculty members to participate in the change.

SIGNIFICANCE

While introducing the following observations, some positive and negative consequences about not establishing a program of this nature or one similar to the redesigned one in the region are being highlighted. The urgency of both considerations is imminent since there is the possibility for other educational institutions to open this kind of educational programs, especially because of the interest that exists in the community of high school students who want to study programs of this nature. Thus, the specific consequences are:

a. The possibility of the disappearance of this program, since the institutional policies of the University of Chihuahua and other institutions in the country suggest that programs of study be revised at least every five years.

b. The tendencies of institutional evaluation, especially in educational programs suggest a drastic reduction of desertion levels and an improvement in the placement of graduates in pertinent labor markets both in time of labor insertion and in the relation to the positions with the training received.

c. The programs will go through a compulsory process of certification by 2006. This process implies: congruence between the name of the program and its contents, standardization of the names of the programs and the courses, the disposition of qualified professors to offer courses in the respective major programs, and the presence of graduates in specific professional areas (especially in one class from one curricular change) among other implications.

d. To maintain the uncertainty of the needs of change to experiment other educational models which will not show the first results until the next four years

and a half as a minimum. The risks for education will be seen in a long term basis, but the consequences will not be known until they are experienced by the people involved.

e. The possible reduction of the number of candidates for this major due to the degree of negative perception that its program of study has had in the social context and the deceit that the ones who decided to study this program even when they knew it was not well focused. This major in Information sciences belongs to a public institution, so it is the only choice that many students who can not access private education have. This constitutes an important problem.

REVIEW OF THE LITERATURE

The goal of this section is to offer different points of view about the tendencies of the Information Sciences study programs in general and to describe the operational context of public universities in Mexico. It is also important to emphasize the conceptions related to the problems to analyze, especially the one involved in the educational organization area, since most of the available information is related to business.

Due to the frequent modifications that the present organizations have, it could be said that the challenge that public organizations and study programs face, should be aimed not only towards experimenting changes to survive, but also towards a total transformation. O'Toole (1995) observes that organizations should not experiment simple changes, but radical and effective transformations where people who lead projects are really convinced about the need of such. This point of view shows the importance of facing changes in educational programs, but at the same time it projects a consciousness about the need to have people really involved in the process to create a real change.

According to Beckhard (1997), Castellanos (1998) and Gonzalez (2000), the transformational efforts of systems and organizations and attitude changes in the

educational area pose serious difficulties, since their structures are based on knowledge and there could exist a greater complication to visualize a specific change. As a consequence, it becomes more difficult to sustain and establish such change. When the nature of the work in the universities is to create and to transmit knowledge, the organizational structure is intangible, such as the case of an educational institution, with study programs and with professors who have freedom in their thoughts and methods, it is possible that the change in attitude results different from other institutions, at least in the process to face it.

According to research done by Mitroff and Denton (2002), the efforts to advance in changes within educational programs, pose other complications since most the professors have been working in the same university for along time and they do not know the real behavior of other labor markets. Because of this, they do not want to experiment any kind of change and suggest modifications to be established by the time they retire.

Likewise, Gabriel (2001) developed some studies about human behavior in relation to his experience in organizations and in the way in which people get involved. He observed that when people have been in an organization for a longer time, they show more power and control mechanisms and a bad conception of culture and leadership. Related to this topic, Ajzen (2001) adds “...the problem in he change of attitude is due to the fact that individuals show a bipolarity in the evaluation of their reality against the apparent effect that organizations and systems have...” (p. 3) and it is obvious that emotion is stronger than attitude change in the evolution of processes.

Then, the change of attitude in organizations, including the perception and acceptance of the project to implant, are some of the processes that represent a stronger challenge since results must be observed both in individuals and in groups. Beckhard and Harris (1997) consider that a great transformation has been created in an organization when the total number of direct participants in the

processes feel that they have made a great effort and consider the results a vision of something that really fulfills their expectations.

Simsek and Louis (1994) offer more concrete points of view toward the change of attitude in the processes developed in public organizations. They recommend changes to be made in different stages, including confrontation of anomalies in the project of change (indicating which aspects of the present situation are working in a wrong manner). In this way, there must be a crisis in the group of participant professors to know the dimension of the situation. They also recommend immediate control once the crisis has begun. Arnold (1998), Wender and Rabinowe (1998) add that if the situation occurs in unions within public universities, it is necessary to previously analyze their political context. In this way, professors could perceive the favorable aspects that could be observed if a change is performed and at the same time which aspects do not affect the labor and union rights of the developers of the new project. This means that we should not forget about the political aspects in public schools and universities.

Conceptual Analysis

In the paragraphs above, the difficulty of convincing people about a new change in attitude considering the environment of the university has been established. Now, it is very important to make a conceptual analysis about the curriculum itself since this one does not consist only of choosing the subjects included in the educational program, but, according to Rodriguez (2002), it also consists of developing a body of knowledge to be transmitted, of defining the educational program that is expected as a result, and of analyzing the measuring processes since enrolment to graduation. This is to be considered as a process with stages and with evolution, thus the possibility of offering an integral person that covers the social expectations in real labor markets.

In the Mexican educative area, one of the most important researchers in curriculum design is with no doubt, Diaz Barriga (1996), who, along with other authors (Nieto, 1998; Pallán, 1999 and Rodriguez, 2002) has discussed the need to define

systematic methodologies to develop a curricular planning in our country taking into account the conditions of public universities, the diagnosis of needs, planning and specification of contents. Lukas (1999) suggests that the inclusion of this in professional majors should be a must "... the analysis and characteristics of context, the future educated person, and the future of the graduate..." (p. 15). In this sense, it is not necessary to include only the opinion and perspective of the participant professors but also the condition of the social contexts where the curricular change will occur.

Perspectives in Information Science Programs

Up to now, several aspects have been analyzed: the perspectives in the difficulty to face changes in the attitude of university professors and the elements that should be considered when structuring educational projects that fulfill the expectations of both internal and external participants in the process of change. Nevertheless, which is the vision that other instances have about how a program of Information Sciences should be? The main world organizations related to this field are the Association of Library and Information Science Education (2002), the American Library Association (2002), and the World List of Departments and Schools of Information Studies, and Information Management Systems (2002) say that there is a great number of names or titles in this area: library science, librarianship, documentation, library studies and library information science. They also add that the ideal would be to create a new name involving all of them, for example, Information Sciences. At least, the University of Chihuahua has an adequate name for this major.

It is true that the name of the major is in accordance to the international opinions, but the contents of the study program is not related at all to the right definition of the major. According to worldwide tendencies, Asch (1999), Hart (2000), and Tenopir (2000), the educational programs in this area must be updated in developing skills for the graduate to face knowledge of information according to constant changes both in its format, its quantity, its pertinacity and its use.

To avoid confusion about the concept of Information Sciences and separate it from communication sciences, Kreizman (2000) considers that the first one refers to the group of methodologies that allows working on information in all of its forms, formats and intentions, from the decision to elect it, manage it and divulge it. It also refers to evaluating, measuring it to be able to preserve it, discard it and renew it. On the other hand, Communication Sciences is based on a generally oral transmission processes. This author adds that information management can occur in traditional library processes as well as in different organizational environments such as business, industries, service organizations, etc.

Future Perspective

The literature review so far analyzed, has focused on recognizing international views in organizational and educational development. Nonetheless, some local perspectives show the general intention to make known an educational vision of the future of our country and the policies established by the National Educational Plan, 2000-2006 by the Ministry of Education of Mexico, 2000) (Department of Public Education). They describe the need to see education during the next twenty five years with professors qualified according to the needs to study programs, as well as the need to update the contents of the programs aiming them to constant and important reformations. The policies of the National Educational Plan, 2000-2006 emphasizes the presence of the use of information and technology in all of the study programs, including the ones of Information Sciences and the graduate should know about these processes.

As a conclusion and considering the previously presented perspectives, Arzu's (1996) academic professional vision about the Information Sciences regarding the conditions that new generations of information professionals should have is the following:

> "The study programs of information sciences have a tendency to change and to recognize the evolution that emerges from librarians and information managers. The libraries are not static organizations that have the function to keep books, but are active and living bodies whose style

> and function tend to show a total metamorphosis. It is a must that curriculum designs in information sciences remark the present activities that librarian perform in their jobs, so we must redefine the necessary skills to move and preserve this profession. The creator of curriculum should admit that the role of the librarian has changed. It is necessary to have a curriculum able to create individuals to be more than book caretakers" (p. 15).

Finally, if we want to see the curriculum of information sciences in the perspective of the social globalization that our country experiments nowadays, Tenopir (1995) and Desai (2001) think that some of the subjects that are included in the present study programs should be eliminated and new ones should be included. For example: behavior in the information research, analysis of information needs, education of users, knowledge management, digital libraries, Information structure, etc. definitely trying to avoid any kind of confusion of this discipline with any other.

METHOD

This action research paper departs from the belief that the Information Sciences major is not well focused in the educational program the Chihuahua University is offering at present time. Departing from the development of an analysis on the requirements of a new profile that fulfills the expectations of prospective students, present students, graduates and labor market, a new proposal in accord to the present tendencies will be generated; as a consequence, the faculty members of the program will accept a change in the study program and he result will be the establishment of a new curriculum properly approved.

Since this action research refers to curriculum matters, we decided to include the method design model suggested by Nieto-Caraveo (1998) which reflects a series of rules for the analysis of the context in a professional curriculum and which suggests some elements that will be correlated with the groups or steps used here. These researchers suggest the following elements:

a. **Preliminary acknowledgement of the relevant context.** The review of the literature is included here for it allows the reader to have a general background and in this way a previous selection and systematization of the relevant variables for the curriculum can be made. This section was included in the review of the literature section of this document.

b. **Identification of participants.** There are groups and individuals whose opinions and knowledge are important in this process. In this section people who could participate directly are included. The participants are classified into two groups according to their origin: the ones who work in the educational institution (professors, managers, students, etc.), and the second one integrated of institutions, organizations and specialists who should be taken into account. This study classifies participants very clearly.

c. Selection of strategies. This section refers to the way in which the participants will respond to the questions; in this case, the research refers to the instruments which can be divided into research instruments as in the case of surveys or documental research and into deliberating strategies, where the individuals participate in a collaborative manner by taking curricular decisions. The instruments to collect data used by direct research groups and the consensus processes used with professors as groups of strategic research are found in this part.

Study Groups

a. Prospective students for the major in Sciences of Information.

b. Present students (those who were studying the program while this investigation was being developed).

c. Graduate students from the program of Information Sciences who finished studying the present program.

d. Labor market (Organizations which would probably hire these graduates).

e. Faculty members working in the program (they were surveyed to know the expectations they had about the redesign of the curriculum), it is necessary to clarify that the group of professors described here became another segment to be researched when they presented the data obtained in the form of a proposal and they acted as study subjects with participation in the consensus.

Once the information of the four previous groups was gathered, it was shown to the support groups in the form of data and at the same time, other information from other instances was gathered to sustain the proposal in a better form. The groups that were considered here were:

a. Experts in the area of Information Sciences.
b. Universities that offer similar programs
c. Bibliographic information that was available and that could support the courses in the future.

Description of the Study Groups

According to the model previously presented and taking into account the elements that conform it, the method that was considered viable for the collection and analysis of data is described here:

a. **Prospective students.** The research refers to those students who are studying the last semester of high school and who might want to go to college. Besides, the research filtered the students who wanted to register in the Bachelor's Degree Program for Information Sciences at the University of Chihuahua. This information was obtained in a collateral study developed with other purposes to know the educational intentions of 4, 650 high school students in Chihuahua City (Tarango, 2002).

b. **Present students.** The students taken into account in this section were the ones who are studying the major in Information Sciences. The data were taken in the 2002-2003 school year. For this paper, it was pertinent to

consider the analysis of the conceptions of the first, fifth, and ninth semester students to analyze the data found about the perception differences in a longitudinal manner.

c. **Graduates.** Samples from four out of the five classes of graduates who were available by the time the information was collected were included. The total number of graduate students was 104, but only 43 of them were located.

d. **Professors.** 23 professors who participate in the program were included. Eight of them are full time and fifteen are part time.

e. **Universities.** 24 programs of study from different universities that offer programs in Information Sciences were consulted through electronic media. Other programs like librarianship, information science, Informative resources management, information and documentation, etc. were also included. Twelve of these universities are located in Europe, two in Asia, twenty three in North America (United States and Canada-Mexico is also included here) and ten in Central and South America. This information was necessary to develop a chart of courses and frequencies.

f. **Experts.** Twenty three national and international experts were surveyed via Internet to collect information. These experts were basically people related to the academic area and people who were related to works in information and in consulting processes.

g. **Bibliographic sources.** There was a general search for printed documents which justify each one of the courses suggested for the new curriculum. The reason for this was to let the faculty involved know the existence of materials for these courses and to guarantee access to information. At least two information sources per course were included.

h. **Labor market.** Institutions that are potential job providers for graduates were included here. The environment was Chihuahua City in eight

educational institutions, five libraries, twenty three maquiladora industries, four industrial chambers and specialized entrepreneur associations, as well as twelve transformation industries were included, summing up a total of fifty two institutions surveyed. It is important to mention that although this study considers the viability of the program of education in the Chihuahua environment, the only place that was analyzed was the capital of Chihuahua State. The data obtained could be generalized to larger environments in the northwestern part of Mexico, since there are similar economic and social conditions both in the state and in the region.

DATA COLECTION

In this section I will introduce a brief description of the instruments used to collect data, the reasons for choosing this kind of procedures, the general intentions and an analysis of the main items that conform it, departing from identifying the research group. The evaluating instruments and the research groups are described here:

1. **Students.** The research methodology used a survey whose objective was to evaluate the perceptions that the students acquire while they are studying the major and the fulfillment of their expectations. The main criteria that were evaluated while using this instrument were: measuring the expectations they had from the major, an idea about the activities performed by graduates, and suggestions of topics and courses that could be included in the redesign.
2. **Graduates.** By surveying, the author tried to define the condition of the students who have already studied the program, considering the professional opinion of individuals who have already gone through the experiences present students are having now. The analysis of the results is interesting while comparing groups. The criteria evaluated with this instrument were: present job activities, measuring the fulfillment of expectations during the time they were studying the program, suggestions

about new topics and courses, as well as satisfaction degree regarding the present content of the major.

3. **Faculty members.** There was an analysis of the courses that professors are offering at present time, of the relationship of these courses with the discipline of Information sciences, of the proposals for new courses according to the needs of the new curriculum and to the needs for training. This analysis was carried out through the use of surveys.
4. **Experts in the area of Information Sciences.** The research tries to gather the concepts of the expert in information regarding labor fields, the proposals for necessary courses, the pertinent labor market, the most frequent activities and the definition of proposals about the characteristics that must be included in the profile of an ideal graduate who will complete his/her studies in Information Sciences.
5. **Labor market.** The research included some items that referred to possible labor fields the graduate of Information Sciences could have access to, and to the main activities, skills and attitudes the employer expects from the graduate. The classification of this research group comprises two general areas: the first one refers to library environments and the second one to industrial, commercial and service environments.

RESULTS

Since most of the information obtained has a qualitative feature, a general description of the results obtained is included here.

Prospective Students

To obtain the necessary information for this section, a study developed by the General Department of Public High Schools of Chihuahua (2002) was used. This study includes the analysis of the vocational preferences of high school students of the 2002-2003 school year and who are about graduating. This study shows information about the majors and the institutions of higher education students want to enroll. The author decided to use this information since the educational system of The General Department of Public High Schools of Chihuahua is the most representative of the high school system in the state for it has a population of

18,500 students and 4,650 people graduate from this institution every year. Besides, this institution provides most of the students accepted (about the 65%) in institutions of higher education that belong to the State of Chihuahua. This institution constitutes the first choice for parents and for students who want to study high school in this state. One hundred and fourteen high school students mentioned that they wanted to study the major in Information Sciences.

First Semester Students

Thirty nine out of a total of forty one students were surveyed. The sample corresponded to the 95.12% of the total. The most relevant data were:

1. **Expectations from the major.** Most of the students said that they were satisfied and only 20.51% said the opposite. This parameter might result acceptable, although the percentages change while students continue studying the major.
2. **Justification of reasons.** The people surveyed were asked to justify the reasons they had to say whether the major fulfilled their expectations or not in a qualitative manner. The answers were very limited. The positive answers were centered in asserting that the positions for graduates would be found in enterprises and to the confusion students have about believing they are studying Communication Sciences, not Information Sciences.
3. **Concept about Information Sciences**. There was an open-ended question that referred to the definition that the freshman has about the concept he/she has about Information Sciences. The results obtained were centered in providing generic and indefinite aspects.
4. **The activities that the graduate will be able to perform**. There are various general groups. For example, the ones with an administrative emphasis (human resources, services, educational administration, and computer processes); another important group is the one related to communications (area of journalistic information, information writing, diffusion, document elaboration, press, script writers, journalist, etc.); some

other occupations were mentioned as well: investigation, information management, user attention, file aspects, librarian and document manager.

5. **Courses suggested**. There were 22 suggestions: five related to research were librarianship, documentation, file management, information mapping and information analysis. Other general areas that were also included were: systems (Internet, computers, etc.), mass media (press, communication, etc.) and the rest were irrelevant proposals with low frequency.
6. **Satisfaction degree towards the major.** Although one of the previous criterion shows that a good percentage of students claims that the major had fulfilled its expectations, in this criterion, the degree of satisfaction was evaluated and the results obtained were more balanced between the affirmative answer and the negative, but the second one had 52% of the answers and the responses aimed to a lack of satisfaction constituted the other 48%.

Fifth Semester Students

30 out of 32 fifth semester students (93.75% of the total) were surveyed. The information provided by this group is described here.

1. **Expectations from the major.** When students were asked if the major fulfilled their expectations, the answer was affirmative in the 62.50% of the surveys, and a 37.50% said that their expectations have not been fulfilled by the present program of study. The reason for the lack of expectation fulfillment was due to the fact that this major does not have a defined focus.
2. **Concept about Information Sciences**. There was a total of eighteen concepts and at least 10 of them included some correct element. It was possible to obtain one complete definition by integrating only one.
3. **The activities that the graduate will be able to perform in the future**. These students provided a total of 17 activities that according to them, a graduate of this major will be able to perform. Six out of the seventeen activities correspond to the discipline, the rest might belong to any other

profession. Among the correct ones are: document indexing, to satisfy the user's needs, to manage information centers, to improve information systems, to diffuse information, etc.

4. **Courses suggested.** Students suggested file management, librarianship, documentation, information mapping, development of information systems, information centers, electronic systems of documentation, document recuperation, cataloguing and indexing.

Ninth Semester Students

The research group of the ninth semester of the B.A. in Information Sciences consisted of 42 out of a total of 43, which correspond to a 97.67% of the total number of students in that semester. This group is very important for this investigation, since they are students who are about to finish their major, so they know the prevailing aspects of the present program of study in more detail.

1. **Expectations from the major**. 97.02% of these students declared that the program had not fulfilled their expectations.
2. **Concept about Information Sciences.** The two correct concepts students provided were:
    a. Use and management, from input, process, distribution and administration of any kind of information, categorizing it in any format presented.
    b. The graduate selects, processes, catalogues, files, etc. information by using precise methodologies of documentation, librarianship or librarian science to obtain concrete results and to take decisions.
3. **The activities that the graduate will be able to perform in the future.** Students surveyed suggested 39 specific activities, which are grouped in these categories:
    a. **Library and Information Sciences.** Information management, to file archives, to select information, to build networks of information documentation and to diffuse information.

b. **Mass media**. Mass media for cultural and news programs, media scripts, interviews, news reports and journalistic research, publicity, journalism, to keep society informed, article writing, production of radio programs, production, as well as opinion and propaganda auditorship.
c. **General administration and administrations of human resources.** Training, people development, personal consulting, team work, public relations, processes improvement, strategic planning, market research, human resources, supervision and administration of productive processes.
d. **Educational processes.** Development of educational proposals, course design, teaching humanities.
e. **Others.** Creating systems or data bases, critical analysis, surveys, statistical analysis, and social research.

4. **Proposals.** The following proposals were included: Processing non conventional documents, technical and electronic documents, information technologies, design and management of information systems, document evaluation, information mapping, indexing, data bases, information analysis, information management for business, information analysis, informative logistic, information theory, techniques for information management, processing, internet for information, patents, copyrights, legislation, infometrics, information tendencies, documentation, librarianship, library science, and information centers.

Graduate

This research group, which is made up of graduates, is a way to analyze the perceptual continuity of students. This means that in the previous section some points of view and proposals made by the students were analyzed. The perception of these students is provided according to their own concepts without referring to any external reality. It is interesting to know and to compare the opinion of graduates who have a double experience: the first one refers to their lives as students and the second one to their reality as employees, faced with the education they received.

By the time this study was developed, there were 104 registered graduate students in the B.A. program of Information Sciences, but only 43 of them were located. They provided these data about the evaluated criteria:

a. **Labor ambit.** It refers to the activities that the graduate is carrying out at present time. It was observed that the majority, a 73.33% of graduate students has a job, while the other 26.66% does not.
b. **Activities that the graduate performs in his/her job**. 73.33 % of the graduates who were surveyed and who are working at present time said that they have different positions which were classified in six different areas (journalistic, radio phonic, governmental, librarian, entrepreneur, and television). They work as co-editors, journalists, trainers, reference coordinator, and librarian.
c. **Relationship between the present job and the major in Information Science**. This section is related to the idea graduates have about whether or not the activities they are performing are truly related to the major they studied. Almost 80 % of the graduates said that the there was a true relationship; nevertheless it can be easily seen that this criterion is not true since only two individuals were actually working in the area: a reference and a library head.
d. **Expectations from the major.** When graduates were asked if this major had fulfilled their expectations, a 75.15% gave a negative answer and only 24.85% mentioned they were satisfied, although the reasons they provided were vague.
e. **Concept about Information Science**. Most of the concepts graduates provided really continue showing some confusion in contents.
f. **Suggestions for new courses**. There were 19 proposals which were grouped this way: Technology of information, library science, cataloguing, database management, information analysis, information management, information systems and information centers (administration and automation), Internet theory, design of WEB pages and computing,

languages, writing, spelling, psychology, communication and public and human relations.

Labor Market

The information obtained is summarized in this way:

a. **Activities performed in the labor market.** The data obtained refer to editing internal documents, to documenting processes, to information center, libraries, statistics department, organizational communication, training aspects, and document writing. These activities are performed in lucrative organizations. There were very concrete answers related to the discipline regarding the area of libraries.
b. **Areas or job departments.** In the entrepreneurial and industrial area, the fields that were considered viable were: human resources, training, manufacturing, organizational communication, knowledge management and internal documents as well as processes documenting; in the area related to libraries: technical processes, services to users, specialized information management, and library administration.

Experts

Twenty three national and international experts provided the information which will be described later. It is important to say that collecting the answered instruments constituted a real challenge; this is the reason for not including predetermined samples but an analysis of diagnostic information taken from the obtained response. The collected data were:

a. **Concept of information Sciences**. The answers were very concrete and were gathered in three basic groups which, due to the academic and working condition of the persons surveyed, show a very concrete way to understand the discipline.
b. **Labor ambits**. The response was too simple and concrete since they specified their labor vision as centered in libraries, files, centers of public and private documenting. They also added that their job opportunities are

found wherever there is an intense use of information for academic, research, decision making, and communication purposes.

c. **Work areas**. The work areas, which refer to labor aspects that are related to the kind of institution in a labor field and in a labor market, the experts considered that the viable areas where graduates can work are education, research, industry, enterprises, service enterprises and all kinds of libraries.
d. **Perspectives towards the major.** The perspectives of the experts who were interviewed are very similar to the points of view which were stated in the review of the literature of this research paper. Like the other collected data, this criterion is very brief but important since it includes some basic concepts like the ones of information and knowledge society, quality services, and a demand for professional training.
e. **Suggestions for courses.** There were 20 suggestions for topics or courses. The most important ones are information management, on-line databases, automation, cataloguing, classification, user training, information technology, Information theory, etc.
f. **Knowledge, skills and attitudes.** The responses provided by experts regarding this section were centered in these suggestions: communicative skills, team work, foreign languages, computing skills, learning to learn, attitude for service, ability to be organized and responsible, highly cultured, time management, and resource administration.

Universities

The second support research group, just like the group of experts, is included in this section. The method used to collect data about the main universities of the world that offered programs similar to the one offered by the University of Chihuahua was a documentary research developed through electronic media. Due to the different conditions among countries, the researcher introduces an analysis separating information about foreign institutions and comparative information about the institutions that offer programs about Information Sciences in Mexico.

The following information corresponds to a total of 51 universities in the world that offer programs in Information Sciences, whose distribution and most important characteristics are described here:

a. **North America** (The United States and Canada; Mexico is analyzed separately). The investigator had access to 20 universities through electronic media and in the specific case of the universities of the United States, other specific sources of information were used since other unionized institutions, as well as a description of characteristics of educational quality were included. The prevailing characteristics in the educational programs that were analyzed and that were found in North America is that most of these programs are at a Master Degree level and few of them are offered in Bachelor Degree level. They are aimed at developing basic skills in this professional education (for example, cataloguing, classification, etc.) but they are mainly centered in aspects related to information management taking the presence of advanced technology as a reference. The working area that they define is both the traditional librarian area and the business information area.
b. **Asia.** Only two universities that offered Information Sciences were found in this continent. They had both B.A. and M.D. programs and they were aimed to the use of technology as a means to keep and recuperate information. The application of these programs proved to be business focused rather than aimed to the pure librarian field.
c. **Europe.** The author accessed 12 universities mainly found in England, Spain and Nordic countries in general. The tendency to educate professionals is very varied both in academic levels (including technical, B.A., M.D., and doctorate levels) and in content focus.
d. **Central and South America.** 10 universities were found. It was observed that the kind of program analyzed here is not very frequent in these continents. Nevertheless, the existing ones have a focus towards traditional processes like solely training librarians.

e. **Mexico.** Seven programs related to the area here discussed were sound in the national context. Due to the importance of this project, they are analyzed in a special way since they conform the real parameters with which the proposal here investigated should be compared without taking as a reference the external proposals.

Bibliography

Due to the importance of justifying that some of the courses investigated could be viable to be included in the program of study and to prevent distrust by professors regarding the existence or non existence of documents that support them, the author decided to include some sources of basic information that could work as the founding in the curriculum redesign. Fortunately, there were enough sources of information for every suggested course.

DEVELOPMENT OF CURRICULAR PROPOSAL

The following section of this document describes the way in which the acceptance of the proposal of a curriculum redesign for the major in Information Sciences was achieved. This process included the development of a first proposal which was later introduced to the faculty members of the program so it could be analyzed either to accept it or to reject it in a work group session by consensus. Since the first proposal was not accepted, the observations of the faculty members were gathered and corrected. Later on, a second group session took place and the proposal was not accepted even with the previous modifications. Some other observations were added. A third group session gave rise to the final proposal, which fulfilled the expectations of the participants and which was definitely accepted unanimously.

The final proposal for the graduate profile was obtained through consensus work with the group of professors who work in the Information Sciences program. This was the proposal:

The graduates will work professionally according to this profile: They,

a. **Apply ethically** the knowledge and methodological bases of information Science in any organizational context, both in document processing and in the generation of knowledge.
b. **Processes documents** in all their formats by cataloguing, classifying, indexing, and summarizing them.
c. **Designs, develops and evaluates** information centers and service centers in different modalities for diverse areas of knowledge by applying the bases for general administration.
d. **Stores and recuperates documents** in all their formats, both in manual and electronic format, in and for data bases or any other dorm of source and information service.
e. **Develops,** through processing information, the structure of diverse products and documental as well as information services which will provide some contribution in training and educational programs, in programs used to diffuse information, programs of organizational documentation, programs of institutional communication, and in research and development programs through the use of printed and electronic media.
f. **Contributes** in the creation, diffusion, analysis and conservation of diverse documents by correlating them in their cultural, social, historical and legal context according to the needs of specific users.

The participants too concluded that the prospective student of Information Science should have these characteristics in his/her proposal for the entrance profile:

a. Intellectual curiosity
b. Liking for reading
c. Creativity
d. Appreciation for use, management and advantage of technology
e. Service attitude
f. Ability to analyze and synthesize
g. Ability for order and systematization

h. Appreciation for administrative processes
i. Interest for administrative processes
j. Respect, confidentiality and discretion in his/her processes and in the information management.

The final proposal of curriculum map with all of the changes suggested by the professors was introduced to themselves. This proposal is included in the follow page (Table 1. Curricular Map Accepted) and was unanimously approved by the faculty members, by the Technical Council and by the University Council to begin working with this program on January 20, 2003.

Table 1. Curricular Map Accepted

First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth
200. Cataloguing Printed documents (4 hrs/wk)	210. Cataloguing Non conventional and Electronic Documents (4 hrs/wk)	220. Classification Systems. (4 hrs/wk)	230. Documental Languages (4 hrs/wk)	330. Serials (3 hrs/wk)	340. Information Mapping (3 hrs/wk)	380. Infometry (4 hrs/wk)	120. Theory of Knowledge (3 hrs/wk)	670. Preservation and Conservation of Files and Documents (4 hrs/wk)
100. Theory of Information (4 hrs/wk)	360. Files and Records (3 hrs/wk)	320. Information Centers (3 hrs/wk)	560. Documental Products (3 hrs/wk)	300. General Administration (3 hrs/wk)	350. Development of Human Capital (3 hrs/wk)	390. Strategic Planning (3 hrs/wk)	570. Organizational Intelligence (3 hrs/wk)	140. Knowledge Management (4 hrs/wk)
400. Research Methodology (3 hrs/wk)	250. Indexing and Abstracts (4 hrs/wk)	660. Users Analysis and Training (4 hrs/wk)	260. Thesaurus Construction (4 hrs/wk)	540. Documenting Processes (4 hrs/wk)	430. Information Services and Sources in Business (4 hrs/wk)	440. Information Services and Sources in Government and Social Sciences (4 hrs/wk)	445. Information Services and Sources in Science and Technology (4 hrs/wk)	680. Marketing Information Products and Services (3 hrs/wk)
600. Advanced Spanish (4 hrs/wk)	610. Composition of Documents (3 hrs/wk)	620. Text analysis (3 hrs/wk)	530. Information Services in Networks (4 hrs/wk)	630. Oral Communication (3 hrs/wk)	625. Contemporary Culture (3 hrs/wk)	640. Philosophy of Culture (3 hrs/wk)	665. Geopolitics (3 hrs/wk)	130 Professional Ethics (3 hrs/wk)
110. Librarianship and Documentation (4 hrs/wk)	500. Technology of Information (4 hrs/wk)	320. Collections Development and Evaluation (4 hrs/wk)	410. Strategies to Retrieve Information (4 hrs/wk)	420. Analysis and Design of Information Systems (4 hrs/wk)	370. Evaluating Software in Information Sciences (4 hrs/wk)	650. Information Legislation (3 hrs/sem)	565. Development of Documental Products Using Technology (4 hrs/wk)	ELECTIVE (3 Hrs/wk)
				ELECTIVE (S) (3 hrs/wk)	ELECTIVE (S) (3 hrs/wk)	ELECTIVE (S) (3 hrs/wk)	ELECTIVE (S) (4 hrs/wk)	ELECTIVE (S) (3 hrs/wk)

CONCLUSION

Considering the previously described results, two great phases of the action-research process can be observed: the first one, obtained through data collection from different groups, consisted on developing an investigation phase that allowed deducing that the focus of the major in Information Sciences was incorrect. At the same time, this phase allowed the development of the first proposal for a curriculum redesign. The second phase, related to the action, consisted on introducing this proposal to the faculty members of the program so they could approve it.

It is important to point out that it was necessary to offer information about the condition and tendency of the educational programs in the world and about the perspectives of the participants in the process (prospective students, present students, graduates, etc.) to the faculty members of the program so they could accept a curriculum redesign. All of this was done to get concrete proposals from the data obtained, since most of the professors could think that the proposal was suggested by the investigator and not from the information sources that would support such initiative.

As it could be observed, the presence of a external consultant is mentioned in the consensus process of the curricular proposals. This is due, first of all, to the fact that the professors were the ones who suggested that an external observer validated the results. In the second place, to the researcher's need to support his proposal with the presence of an external expert. His participation was focused more towards observation, since the results convinced both the investigator and the professors.

The acceptance of the final result could be shown here as a simple consensus by professors, but this is more complicated since it implies initiatives by participants. Such initiatives refer to the professors' showing interest in getting involved with a training program in continuing education, in accessing a Master's Degree program

in Information Sciences, in asking for bibliography to support their classes and to the initiative to get in contact with graduates to know the new vision of the major.

Although every curricular redesign is different, it can be assumed that the methodology here followed is easily generalized for the development of similar processes. Working on an investigation before carrying out any kind of action allows the possibility to know multiple alternatives before developing proposals. This means that not only information about other programs presently working is included, but also the possibility of considering the perspectives of the individuals who participate in the process, the possibility of gathering both groups of data, as well of the development of proposals that allow the deduction and enrichment of new solution alternatives.

Finally, it is acknowledged that the processes of action research have multiple working phases, one of which is the result of this investigation. This means that what has been introduced here requires other processes, especially action processes to take the final result into practice. The final result could not be clearly observed until the first class of the new program graduated. This also implies the development of specific syllabi of the courses, the establishment of training programs for professors, and other actions resulting from its establishment.

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