MENTORING IN THE FINAL PROJECT OF A BACHELOR IN STATISTICS

María Teresa Blaconá
Universidad Nacional de Rosario, Argentina
mblacona@fcecon.unr.edu.ar

In many degrees it is requested that students should do a final project under the guidance of a professor at the final stage of the bachelor's program. This is the case of the bachelor program in statistics (Licenciatura en Estadística) of the School of Statistics of the National University of Rosario, Argentina. In fact, the lecturer in charge of guiding the student is not only the advisor but also the mentor, because in many cases the project consists of solving not only an academic problem but also a real-life problem with up-to-date methodologies. Therefore, the professor should help the student deal with situations that would arise in his or her professional life.

INTRODUCTION

In many degrees it is requested that students should do a final project at the final stage of the bachelor's program under the guidance of a lecturer. This is the case of the Bachelor in Statistics degree (Licenciatura en Estadística) of the School of Statistics at the Universidad Nacional de Rosario (National University of Rosario), Argentina.

The concept of mentoring has found applications in virtually every forum of learning. In academics, mentor is often used as a synonym of faculty adviser. A fundamental difference between mentoring and advising is that mentoring is a personal, as well, as a professional relationship. An adviser might or might not be a mentor, depending on the quality of the relationship. A mentoring relationship develops over an extended period, during which the student's needs and the nature of the relationship tend to change.

In fact, the lecturer in charge of guiding the student is not only the advisor but also the mentor, because in many cases the project consists of solving not only an academic problem but also a real-life problem with up-to-date methodologies. Therefore, the lecturer should help the student to deal with situations that would arise in his/her professional life. One important role for a mentor is to assist the trainee in understanding and adhering to the standards of conduct within his/her profession.

A mentor is someone who willingly takes a special interest in helping another person to develop into a successful professional. In the final project, it is very helpful that the lecturer behaves as mentor, given that the student at that level does not have the maturity or the experience that graduate students have in post graduate programs. The experiences generated by the relationship between the student and the lecturer working in the final project are in accordance with the definition of mentoring that states that an adult offers support to a younger individual, providing guidance through difficult periods in order to solve concrete problems (University of Miami, 2004).

This relationship between the student and the lecturer would fall into the category called natural mentoring, although the relationship is established through a formal mechanism. When a lecturer provides good mentoring helps the mentored students improve their overall academic achievement; this type of mentoring is referred as educational or academic mentoring. In statistic, a good mentor seeks to help a student to optimize an educational experience, to assist the student's socialization into a disciplinary culture, and to help the student find suitable employment.

In the next section, the fundamental mentoring concepts that can be used in the final stage of the bachelor program are developed. Then we present a brief explanation about how a final project is developed and executed as well as its relation with the mentoring and some real examples. Finally we include a short discussion about mentoring.

THE BASIC CONCEPT OF MENTORING

The final project at the final stage of the bachelor's program is when the student needs to transfer the knowledge acquired during the degree to the work experience. The success of the

project depends in a large proportion on the supervisor, and it is convenient that he/she behaves as a mentor.

To achieve this, the mentor should help the student to choose the topic and to determine the problem. Generally, the student is the one who brings the problem because he/she has been in contact with other professionals, but usually the student does not have a clear idea of what is the problem and how to solve it. A good mentor would help in this stage by sharing life experiences, as well as technical expertise. The mentor should make an effort to know, accept and respect the goals and interests of the student.

The nature of a mentoring relationship varies with the level and activities of both student and mentor. In general, however, each relationship must be based on a common goal: to advance the educational and personal growth of the student.

Among the goals that should be considered for the successful development of the final project are:

- The project should be done in the appropriate time
- It should meet the expectations of the professionals that requested it
- The student should apply appropriate and up to date methodology
- The student should be able to understand what it is requested from him/her
- He/she should be able to interpret and transmit the main results clearly
- He/she should be able to identify future developments that could be done on the same topic.

The time and dedication a mentor needs to spend to guide the student in these aspects depends on the student. A good mentor would know how to distinguish between students and give each one the time he/she requires and encourage and develop the individual skills.

The mentor should take into account that the student not only should solve the problem correctly but he/she should teach the student to behave in a professional manner, with all that that implies.

The mentor should have different roles with respect to the students in different situations. The mentor should be a role model who should introduce the student in the statistic culture. The mentor could act as a sponsor introducing the student to the right people, as a supporter focusing on being there when needed, providing opportunities and he/she should also consider the emotional aspects. The final role, educator, focuses on the learning processes, articulates the practice and helps to achieve the learning goals (Fullerton, 1998).

Mentoring is very complex, and subject to widely differing and even conflicting interpretations. There are some general objectives included in the mentoring interpretations: mentoring aims to facilitate and enhance learning, growth and development of the mentee within a protected relationship.

MECHANISM OF DEVELOPMENT AND EXECUTION OF THE FINAL PROJECT AND ITS RELATION TO MENTORING

Generally final projects in the Bachelor in Statistics at the UNR are about solving a real problem applying the appropriate statistical methodology. To achieve this, frequently the following stages are followed:

i.- A connection is made with a public or private organization, the agreement with this organization is sometimes formal with a contract and sometimes informal.

The first contact can be done by the supervisor (mentor) or the student. If the contact is done by the supervisor, he/she should introduce the student to the problem and when possible, he/she should introduce the student to the responsible person in the organization (client). On the other hand, if the student is the one who proposes the topic because he/she is already working or due to personal interest, the mentor should determine if the problem is suitable to be considered for a final project.

This experience has been done with organizations like the Instituto Nacional de Estadísticas y Censos (INDEC), Instituto Nacional de Tecnología Agropecuaria (INTA),

Municipalidad de Rosario, Secretaría de Salud Pública Municipal, other faculties of the Universidad Nacional de Rosario, Observatorio Astronómico de Rosario, private companies, etc.

In this stage is fundamental that the supervisor behaves as a mentor, advising the student about how he/she should relate to professionals in his/her own area and other disciplines to be able to interpret correctly the client's needs.

ii.- The problem should be limited to a dimension so it is possible to finish the project in the stipulated time. Again in this stage the mentor's role is important because in general the student does not have the experience or the knowledge to estimate the time to complete the project. In this stage the main and general objectives of the final project should be determine.

iii.- The bibliography about the topic should be researched. This stage is more of the academic type and hence the mentor's role is like the one of a traditional lecturer.

iv.- The methodology of the project is determined. In this stage the mentor should guide the student so there is a balance between the academic requirements of a final project and the practical usefulness of the results.

v.- Results analysis and the way of presenting them. Again, the mentor should intervene to make the student distinguish the main results from the no so important ones, as well as which is the best way of presenting them to the stakeholders. In this stage, the interaction between the student and/or the mentor with the stakeholders is very important.

vi.- The writing of the final project including a discussion about the main topics studied. This is an academic requirement that is formally done, and once the student finishes the written work and is checked by the supervisor (mentor), the project should be approved by a jury formed by three lectures and it also should be defended in an oral presentation.

Once this stage is formally finalized, the student receives the Bachelor in Statistics degree. However, there is a non-formal final stage.

vii.- The results should be presented to the stakeholders. This sometimes includes as well as a written report, personal interviews, where the mentor should train the mentee so he/she can communicate properly with the stakeholders.

In some cases, when the students are already working in the organization where the problem is originated, this experience helps them to better positioned themselves in the organization and to do a type of work that concord with there profession. In other cases, when the mentor is the connection, this experience allows the student to get new work opportunities.

The difficulties of doing this type of experience are: i) sometimes there are not enough organizations interested to cover the needs of all students, ii) in some cases the problem can not be delimited so it can be solved in the final Project, iii) there can be some susceptibilities to the professional advice. These are the reasons why sometimes the final project is done in a more traditional way.

Figure 1 summarizes the stages of the final project, differentiating the ones in which mentoring is applied from the traditional academic ones.

The purple boxes are the stages for which it is important to apply mentoring methodology; the blue ones are those in which a traditional methodology can be applied.

The experience through the years shows that doing final projects with these characteristics is very favorable in the professional training of the student.

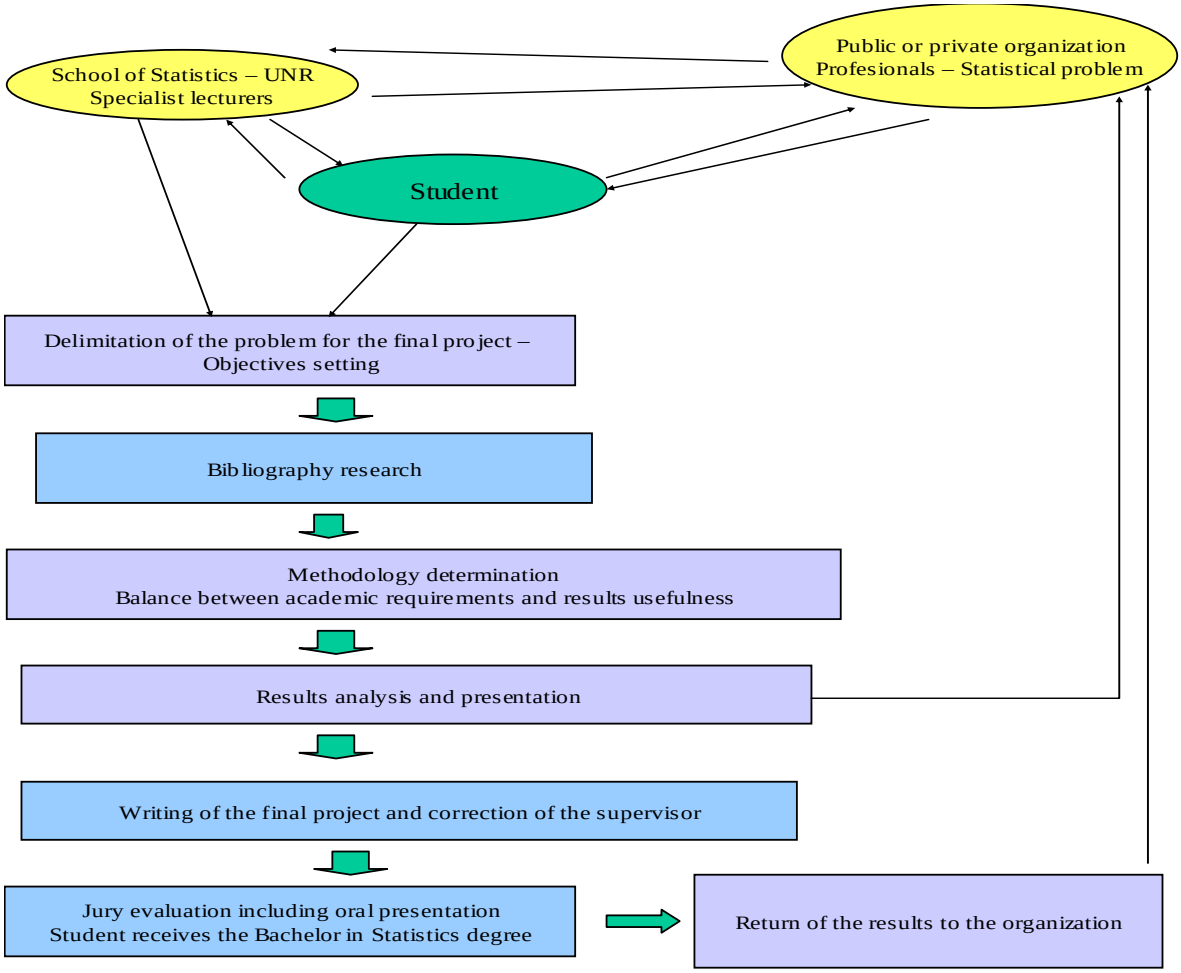

Figure 1: Bachelor in Statistics Degree final project stages

As an example, three current experiences with students that finalized their course work and only their final work is left to finish their degree are shown:

1) A student starts working in a steel sales company that commercializes 1500 products. The Planning Demand area asks her to organize and forecast the future sales of all products. Currently the project is at its first stage where the problem is been delimited to be able to do the final project from the company requirements.
2) A student who has a cadetship at the Secretary of Public Health of the Rosario Council, is doing her final project based on a study about the demand of the different services the institution provides. With this student the final project objectives have been determined and the project is at the stage in which the bibliography is researched.
3) A student has a connection with a group of Hydro Engineers that study the rivers' height in the Andes ranges in the Esquel zone in the Chubut province. For them it is very important to forecast the different heights at different points in the rivers during different seasons. This student is in the data analysis stage.

CONCLUSION

This paper shows experiences in which mentoring is done naturally when students are doing their final project of the Bachelor in Statistics degree.

This type of experience has been done for several years and it is possible to emphasize several positive points. As well as the ones that are purely academic, we can highlight:

- The student is supported in his/her first professional work experience
- Allows the lecturer to face real problems that can be capitalized as examples in the Bachelor in Statistics degree lectures.

- Allows the student – lecturer relationship to go further than a conventional one that sometimes can be sustain through the years.
- Quite frequently the student comes back when he/she has a statistical problem during his/her professional career.

To conclude, this paper shows that mentoring can be a useful tool to use in the final project of the Bachelor in Statistics degree when the students number allows it.

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