

Development of the “Mentoring” program at UADY’s School of Mathematics

Ashanty Francely González Concha, Valeria Ysabel González Meneses, Eduardo Zenet López Guerrero,
Universidad Autónoma de Yucatán

Resumen— Este artículo presenta las distintas fases y actividades del proyecto que consistirá en un programa llamado “Tutores Pares”, que contendrá diversas sesiones en las cuales los tutores proporcionarán información académica que es importante para los estudiantes de los primeros dos semestres de carrera. Asimismo, la información se presentará de forma verbal y visual.

Abstract—This article presents the different stages and activities of the project which will contain a program known as “Mentoring” that will have multiple sessions in which the tutors will provide to the students in the first two semesters academic information that is relevant to them. In addition, the information will be verbally and visually presented along this article.

Keywords —mentoring, students, bachelor’s degree

I. INTRODUCTION

Due to the current situation at the Faculty of Mathematics (FMAT) is important to provide students the help they need on the difficult subjects according to the student. The rate of school dropouts has increased over the past few years due to misinformation of academic processes that are needed or because they have used up all their opportunities to repeat a subject that is difficult for them. The Institute offers a Tutoring program taught by teachers, however, the number of students attending to the School of Mathematics is greater than the number of teachers that are part of the Tutoring program.

The “Mentoring” program “...is well-known and, without a doubt, the most commonly used program where senior students tutor freshman students. In this type of tutoring initiative, it seems like the age difference guarantees the help quality that is brought by the tutors” according to Melarango (1976).

Senior students have a better knowledge of what is like to be a freshman and the process that is related to it. Furthermore, due to their experience as a freshman, senior students recognize optimal ways of reorganizing their freshman schedule so they could have had a better performance in their first year of University since they already lived that and that information can be very useful to someone that is new in University. Additionally, senior students can help freshman by suggesting them how they could organize their own schedule, so they do not fall behind in their ongoing courses because of not knowing how to arrange their schedule. Moreover, senior students can also help by giving advice to those that are in their first year of University on which teacher to choose or on

assignments from subjects that senior students have already coursed.

The “Mentoring” program is an approach that is designed to satisfy the previously mentioned freshman students’ necessities according to the following:

Objective

The main purpose of this project is giving support to get acquitted to UADY’S School Mathematics with the help of a senior student tutor who could be more available than a teacher and whom they will feel more comfortable with.

Argument

This initiative was created thinking of the students who will benefit from this. The students at the Faculty of Mathematics will have more of a personal treatment and, consequently, it will create an environment of trust between students since there have been cases of school dropouts related to the lack of knowledge of important academic process, like the number of opportunities a student has to take a class again in case they fail it.

The following document details a Project best known as “Mentoring” that will take place at the Autonomous University of Yucatan’s Faculty of Mathematics. The goal is for each student to have the right to choose a tutor that knows and has experienced what is like to study the first two semesters of the Bachelor’s Degree in Software Engineering, and who gives academic information and helps during the adjustment process in the previously mentioned Bachelor’s Degree.

This Project only describes the academic procedures that are relevant to the students, so they can make accurate decisions throughout their school life. Senior students and freshman will only discuss academic matters, personal issues will not be talked about during Mentoring. This program will not provide relevant information to sophomore students.

II. METHODOLOGY

Due to the extensive paperwork that is needed to launch this project, the “Mentoring” program was presented as an initiative, so the development stages that were made were the requirement analysis and the design process.

Problematic and Project definition

We chose this problematic, of helping freshman students by providing them the information they need via

“Mentoring” as well as creating a trust environment between students, instead of the other problematic we had thought of since we feel like this is the most appropriate topic to talk about due to the current situation. We wanted to do more research and try to solve this issue since teachers have told us the different reasons why students drop out of school, and that is because they simply do not know about the process they need to make in order to keep up with their academic life and to stay in this School.

Then we interviewed the teacher of Orientation and School Board Laura Carolina Sánchez Leal, the Dr. Edgar Antonio Cambranes Martínez, Academic Coordinator of the bachelor’s degree in Software Engineering, and the graduate Genny Centeno Metri, headboard of the Women Who Code Merida project.

Those interviews helped us to know more about the matter and it also helped us to find ways to solve this issue.

Furthermore, we created a GitHub repository where we gathered the documents that justify the making of this project, as well as the benefits and overall guidelines of it.

Requirement Engineering

The following Systems Requirements Specification emerged because of the necessity to develop a project that consists of tutoring sessions that works as a guide to help freshmen successfully adjust to their first year in the bachelor’s degree in Software Engineering at the Autonomous University of Yucatan’s Faculty of Mathematics.

The Systems Requirements Specification helps us to clearly and precisely identify the requirements and restrictions that this program may have along the process according to its main features.

This system will provide valuable information to the user so it can make accurate decisions during its school life. Said information will be given via “Mentoring”, senior students helping freshmen.

According to this program, we identified the following roles/stakeholders:

1. *Tutored student (freshman)*. A user that has graduated from Highschool and has knowledge of information systems, webapps, as well as the bachelor’s degree in Software Engineering. The activities of the tutored student are identifying its current academic issues, just as the mandatory subjects that he is enrolled in and the teachers that teach those subjects.
2. *Tutor (senior student)*. This stakeholder is enrolled in University. It has the knowledge of information systems and webapps, as well as information about the bachelor’s degree in Software Engineering and a wide knowledge

about academic processes that are required during the school’s enrollment. One of the tutor’s activities is to identify the issues that other students, in the same bachelor’s degree, have and he is also responsible of orienting freshmen.

Learn more about the system’s requirements in:

https://github.com/asha-gc/PROYECTO_FIS/blob/master/REQUERIMIENTOS.pdf

Design

Infographics were created showing the induction process (Fig.1) where we recruited and trained senior students to



be tutors; from when the first call has been made to when the freshman student chooses who its tutor will be.

Fig 1. Induction process

In addition, we also made another infographic showing the process during the “Mentoring” program shown in Fig. 2.



Fig 2. Mentoring process

We also made our artefacts:

1. Announcement: https://github.com/asha-gc/PROYECTO_FIS/blob/master/CONVOCATORIA2.png
2. Detailed announcement: https://github.com/asha-gc/PROYECTO_FIS/blob/master/CONVOCATORIA1.pdf
3. Training process: https://github.com/asha-gc/PROYECTO_FIS/blob/master/GUIA_CAP.pdf
4. Mentor's guide: https://github.com/asha-gc/PROYECTO_FIS/blob/master/TUTORES.pdf
5. Mentoring's guide: https://github.com/asha-gc/PROYECTO_FIS/blob/master/TUTORADOS.pdf
6. Google Form: https://docs.google.com/forms/d/e/1FAIpQLSeyKcnamrcZ8Jz8oMSN5JuDVsfRq9XHt2aGzRjqAvUxY-0zA/viewform?usp=sf_link
7. Prototype: https://github.com/asha-gc/PROYECTO_FIS/blob/master/PROTOTIPO.pdf

Where we detailed how this program Works from the beginning where we recruit volunteers so we can train them to become tutors, to what happens during the process of this project.

III. PROJECT FOLLOW-UP

In the following section we explain the tools, methods and processes we used to make this project work:

Tools used:

1. *Slack*. To communicate between team members.
2. *Canva*. Advertisement Design.
3. *Trello*. Task allocation and scheduling.
4. *Power Point*. To make presentations for the tutoring training.
5. *UADY Virtual*. To make the system where freshmen will choose their tutors.
6. *Word*. To write the project's documents.
7. *Google Forms*. To survey tutors and tutored students.
8. *Excel*. To have better control of the gathered data.
9. *Hangouts*. To communicate with the academic staff when face-to-face meetings are not possible.
10. *Google Docs*. To share documents written by the team members so we can work collaboratively and review them.
11. *GitHub*. Repository where we will gather all the artifacts that turnout from each developing stage.

12. *Soapbox*. Every meeting will be registered in Soapbox.
13. *Google Drive*. Temporary repository where documents that are not found in Google Docs will be shared, like images.

Tasks

The tasks that were completed during this Project are the following:

1. Interviewing the academic coordinator Edgar Cambranes and the headboard of DOCE, Laura Sánchez and Sharon Escobar, as well as the graduate Genny Centeno.
2. Interviewing senior students.
3. Doing the activities' Schedule.
4. Writing the document regarding the overall information of the Project.
5. Recruiting volunteers that want to participate in this Project.
6. Training said volunteers so they can be tutors.
7. Launching a system where we will spread the list of tutors that are available.
8. Assigning a tutor to a freshman student.
9. Designing a survey about the student's experience in the program.

It is estimated that each week we will complete at least two tasks.

Process

Regarding the process of this Project, we chose to adopt the Scrum methodology where each developing phase is divided by sprints.

1. *Product Backlog*. In this part, we listed all the activities and tasks related to the requirement analysis, as well as the interviews needed for the research of this Project. Furthermore, we established the artifacts, like the tutor and tutored student guides, the project's poster and the video talking about the process of this project.
2. *Sprint Planning*. During this task, we determined the activities that were going to be included in the next Sprint. With the help of Trello (Fig. 3) we were able to define the roles for each member and the tasks that each of us were going to complete.

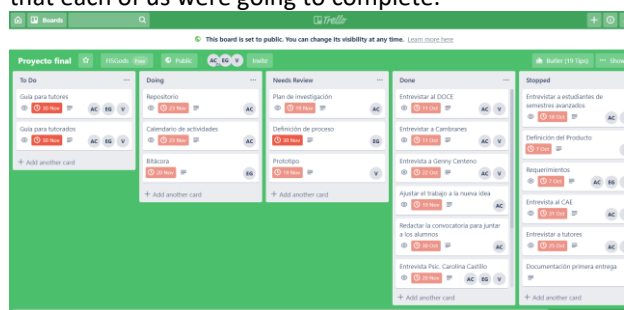


Fig 3 Distribution of activities on Trello

3. *Sprint Backlog*. All the information gathered in each

Sprint was stored in the GitHub repository. Each sprint has a duration of a week.

4. *Daily Scrum*. The staff that participated in the Daily Scrum was the M.O.C.E Laura Sánchez, the Software Engineer Genny Centeno and the Dr. Edgar Cambranes. Our meetings with Dr. Edgar Cambranes and graduate Genny Centeno were via Hangouts. We logged every meeting in Soapbox.
5. *Sprint 1*. We scheduled every activity in Trello. Afterwards, we interviewed the academic coordinator Edgar Cambranes, the headboard of D.O.C.E, Laura Sánchez and Sharon Escobar, and the Software Engineer Genny Centeno.
6. *Sprint 2*. We had a meeting with the Psic. Carolina Castillo. After that, we designed the prototype with the help of Canva. To conclude this sprint, we made a survey for potential mentors through Google Forms.
7. *Sprint 3*. In this sprint we designed the Mentoring Program guide in Canva and then we designed how the first call was going to be. Lastly, we wrote the article detailing this project's process.
8. *Sprint 4*. In here we designed the guides for the tutors via Canva. We also made a video explaining the process that we went through for this project and how the product works.
9. *Sprint 5*. We received feedback for the tutor and tutored student guides from the M.O.C.E Laura Sánchez.
10. *Sprint 6*. We improved and fixed the guides according to the feedback given by the academic staff.

The team is formed by three people: Ashanty Francely González Concha, who was the Product Owner, Valeria Ysabel González Meneses, who was the Scrum Master and Eduardo Zenet López Guerrero who was part of the Development Team. Since our team only has three members, we tend to change roles depending on the situation.

Ashanty González is responsible of scheduling the team's tasks in Trello, just like helping the other two team members in case they have any questions or difficulty during the project. Ashanty González is also responsible of the flyers design that will help us to spread information about the program. Alongside Valeria González, they both interview the academic staff and she also helps with spreading information with the help of the flyers. Genny Centeno is one of the people we will work with, who will help us to solve our questions, in case we have any, and to brainstorm ideas; she lives in Canada, so any type of communication will be made through Google Hangouts. The academic coordinator Edgar Cambranes is also helping us through this process, but since he sometimes is very busy with academic

purposes, we also communicate with him through Google Hangouts. Additionally, Valeria González will gather information from the surveys made to senior students through Google Forms and will also do and organize the power point presentations that we are going to use to train senior students to be mentors. Eduardo Zenet will be responsible of logging every meeting and activity we do along the project in Soapbox alongside Valeria González. They will also be responsible of making the prototype in Canva and between the three team members we will define the overall guidelines for this initiative. The entire team will be responsible of writing the documents for the project, starting by making a draft in Google Docs and, after we finish it, we will upload it to GitHub. After finishing this project, we will survey the users about their experience in the “Mentoring” program via Google Forms. The answers we get will be gathered in an Excel.

As mentioned before, we divided each task through Trello, and we created a distribution system where we assigned tasks according to the team member’s skills. To measure their contribution, we gave each task value as shown in Fig. 4, where the simplest activity was worth a point, the more complex activities were worth two points and the most “difficult” activities were worth three points. At the end we add up those numbers and we get the results of how much each team member participated in the project.

Team member	Tasks	Value	Total
Ashanty Francely González Concha	Interviewing the DOCE	1	13
	Interviewing Edgar Cambranes	1	
	Interviewing Genny Centeno	1	
	Document refinement	2	
	Program’s first call	1	
	Research	1	
	Repository	2	
	Task schedule	1	
	Meeting with Psic. Carolina Castillo	1	
	Guides designed in Canva	2	
Valeria Ysabel	Writing the subject’s skills	1	13

González Meneses	in relation with the Project		
	Product prototype	3	
	Interviewing DOCE	1	
	Interviewing Edgar Cambranes	1	
	Interviewing Genny Centeno	1	
	English version of the project’s video	2	
	Writing of the article	2	
	Main structure for the Mentoring Guide	1	
	Interviewing Psic. Carolina Castillo	1	
Eduardo Zenet López Guerrero	Interviewing Psic. Carolina Castillo	1	13
	Logs	3	
	Process Definition	1	
	Video editing	2	
	Requirements document	2	
	Tutor’s guide refinement	2	
	Article Refinement	2	

Fig 4. Tasks distribution chart

IV. LESSONS LEARNED AND ACQUIRED SKILLS

We learned how important it is a well-written document. Starting with the requirements analysis, since they help us in different stages of this project. Furthermore, we learned how to make prototypes and non-software activities to gather information and how important communication is in the team and with other people. After that, we learned how to divide each task by mini-projects or Sprints, in that part communication is key if we want this to go well without any delay, because we communicate with the client and the team. It is also important to put the user’s necessity before anything else.

As shown in Fig. 6, we acquired the skill to evolve within the Software Engineering principles by first understanding the key concepts before starting to communicate with stakeholders. After knowing the techniques and tools that would help us with our project, we chose the ones we thought were the most useful, like Trello, Slack, GitHub and Soapbox, to mention a few. Later in the project, we adjusted it according to Scrum methodology, which allowed us to see the differences between traditional and agile methodologies. Lastly, we analyzed quality factors according to different authors, we chose the Garvin ones and compared them to our project adjusting his ideas to a more dynamic project to ensure the quality of our product.

Skills	Characteristics
UNIT 1: The student analyses the disciplinary evolution of Software Engineering, as well as the profile required according to the conceptual framework and the curricular models of the subject.	We developed the idea and the objective of the project based of the key concepts of Software Engineering. We implemented the Software Engineering principles to start communicating with the client and stakeholders.
UNIT 2: The student analyses the main methods, techniques, procedures and good practice used in the requirements, design, testing, implementation, deployment and maintenance software stages according to the concepts taught in class.	We used Trello, Slack, GitHub and Soapbox as our main tools during the Project. We made surveys to know the problematic and to develop and objective that is efficient and relevant to the issue. We wrote down the System Requirements analysis.
UNIT 3: The student chooses the Software Life Cycle at the beginning of a project based from the development team characteristics, the client and the problematic.	We used the scrum methodology We divided the Project by weekly sprints. We identified the differences between agile and traditional workflows.
UNIT 4: The student analyses the main methods, techniques, procedures and good practices used in the estimation, planning, follow-up, control, quality and software administration according to the concepts taught in class.	We developed the project based from the user's satisfaction. We used Garvin's quality factors and compared them to our Project. We delivered a usable product with the feature that the user wants.

UNIDAD 5: Identification of the principal human factors that impact in the successful or fail of the software process, according to the theoretical framework of the discipline UNIT 5: The student identifies the main human factors that must do on the success or failure of the software process according to the concepts taught in class.	Roles were assigned in the team. Tasks were organized according to the team member's skills. Contribution was measured individually.
--	--

Fig. 5. Competencies and acquired abilities.

V. CONCLUSION

During this course we were able to see how it would be like to be a software engineering, the responsibilities that come along with that profession. From how a Software Engineer profile should be, to the software developing stages that are implemented in a project.

In addition to that, we also identified the issues that exist in the School of Mathematics and we made multiple interviews to different academic staff to do more research about it. We think that this proposal is important to the current situation because, according to de information given by the Dr. Jorge Ricardo Gómez Montalvo, responsible of the Tutoring program implemented by UADY, there are 1033 students enrolled at the Faculty of Mathematics, whom only 991 students are in the Tutoring program, said program only has 96 teachers for every 991 students. That means, that each teacher tutors approximately ten students, so the attention the students received is not as personalized as the student would want.

With that said, this project is relevant to said issue, because senior students that volunteer will help freshmen during their first year to adjust and help by giving them advice in regards of their schedule or their current subjects, since senior students already went through that process. Furthermore, the trust that is created between students is not the same as if it was a teacher giving them advice, since they graduated years ago, so they do not really know what is like to be in that first year because each year is different. In regards of that idea, students mentoring other students are able to portray themselves and remember what it was like to be a freshman and what they wish someone would have told them to have a better performance at school and to choose wisely their teachers.

BIBLIOGRAPHY

- [1] IEEE Recommended Practice for Software Requirements Specification. ANSI/IEEE std. 830, 1998
- [2] SEP, & FLACSO. (2014). Yo no abandono. Manual para implementar la tutoría entre pares (alumno-alumno) en planteles de educación media superior. México: Secretaría de Educación Pública. Recuperado de:
http://www.sems.gob.mx/work/models/sems/Resource/11390/2/images/yna_manual_4.pdf.
- [3] Instituto politécnico nacional Escuela superior de economía programa institucional de tutoras. Recuperado de:
<https://slideplayer.es/slide/1044989/>.
- [4] Gómez, et, al. (2016). Guía del tutor. México: Programa Institucional de Tutoría. Recuperado de:
http://www.saie.uady.mx/tutorias/media/Tutorias/Guia%20del%20tutor/nueva%20gu%C3%ADa%20del%20tutor_24%20OCTUBRE.pdf
- [5] Morales, et, al. (2018). Programa Institucional de Tutoría. Educación Media Superior. Recuperado de:
[file:///C:/Users/asha2/Downloads/PIT_EducSuperior.%20\(2\).pdf](file:///C:/Users/asha2/Downloads/PIT_EducSuperior.%20(2).pdf)
- [6] Grijalva, F. (2017). Entrevista inicial del tutorado. Recuperado de:
http://www.mat.uson.mx/sitio/documentos/tutorias/primera_entrevista.pdf