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Title: Leadership in the professional training of Computer Systems Engineers

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PRESENTATION CONTENT

- Introduction
- Methodology
- Results
- Conclusions
- References

INTRODUCTION

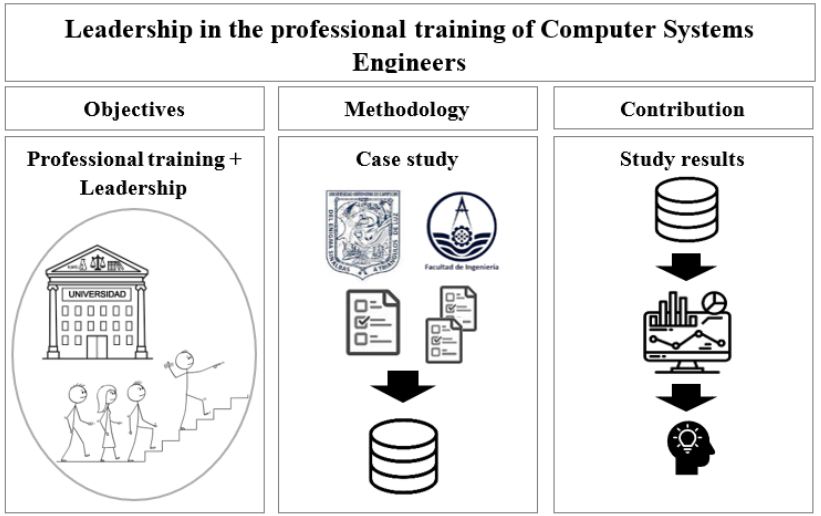
- Leadership is a fundamental concept in various disciplines, and in recent years it has gained special relevance in technical fields, such as computer systems engineering.

- In the context of computer systems engineering, leadership takes on characteristics due to the nature of projects that involve high technology, collaborative work, and constant innovation.

- The importance of leadership in computer systems engineering lies in the fact that, in addition to technical project management, engineers need interpersonal skills to lead diverse teams, collaborate across multiple areas, and maintain a strategic focus on technological innovation.

- This study conducts field research to evaluate leadership styles in students from the Autonomous University of Campeche, and how they will face their insertion into the labor market as leaders in computer science.

Graphical abstract



METHODOLOGY

Data collection instrument

The Goleman Test evaluates Emotional Intelligence (EI) to determine leadership style, assessing five key skills:

- Self-awareness: Recognizing one's emotions, strengths, and limitations.
- Self-regulation: Controlling and channeling emotions under pressure.
- Motivation: The internal drive toward achieving clear goals.
- Empathy: Understanding and connecting emotionally with others.
- Social skills: Effective communication, conflict management, and inspiring leadership.

His test evaluates leadership competence through 20 items rated on a 5-level Likert scale. The most effective leaders, according to Goleman, possess high emotional intelligence (EI).

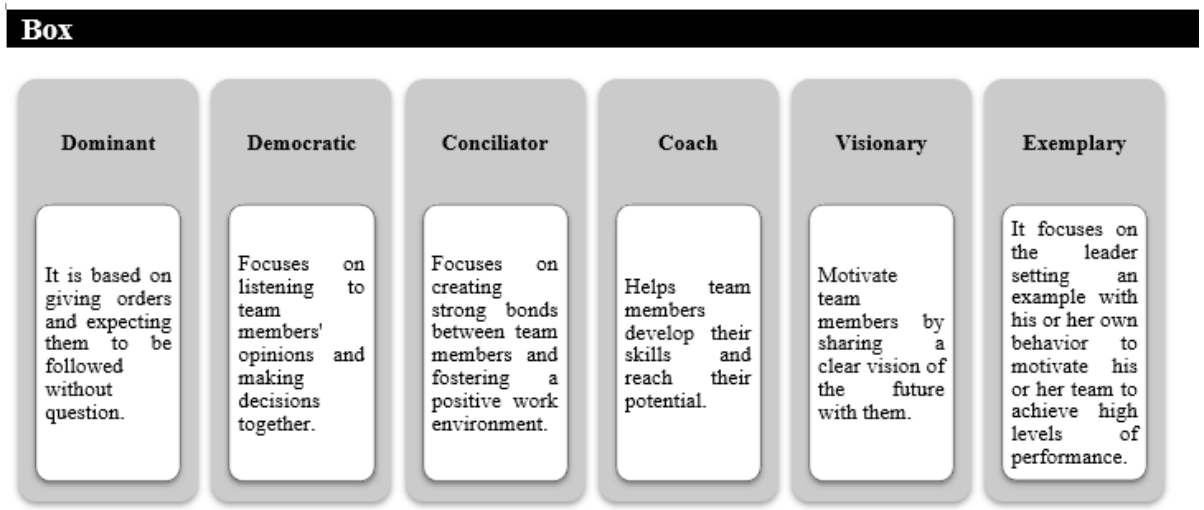


Figure 1

Daniel Goleman's Leadership Styles.

Source (Goleman, D., Boyatzis, R. & McKee, A., 2016)

METHODOLOGY

Case Study

- This study stems from an inter-institutional project between the Autonomous University of Campeche (UACAM) and the Higher Technological Institute of Hopelchén (ITSH), focusing on leadership as a skill in students from indigenous communities in the Los Chenes area.

- The Goleman Test was applied to students from the last semester of the Computer Systems Engineering program at UACAM to identify the predominant leadership style after their professional training.

- The population includes around 60 students, and the sample size was calculated to be 52, ensuring a 95% confidence level using a normal distribution formula. The aim is to evaluate leadership characteristics in this specific group of students.

Box

Table 1

Sample size calculation.

Parameter	*Description*	*Value*
N	total number of people who could be surveyed.	60
k	Probability that the answers are true. A confidence level of 95% was proposed here.	1.96
p	Proportion of individuals in the population that possess a specific characteristic.	50%
q	Proportion of individuals that do not possess a specific characteristic, q=1-p. With equal probability of success and failure.	50%
e	Difference between the responses of the sample and the total population.	5%

Own Source.

METHODOLOGY

For the sample size, the following formula is utilized:

$$n = \frac{(k^2\ qpN)}{\left((e^2\ (N-1) + k^2\ pq)\right)} \rightarrow n = \frac{\left((1.96)^2\ (0.50)(0.5)(60)\right)}{\left(\left(e^2\ (60-1) + (1.96)^2(0.50)(0.50)\right)\right)} = 52$$

Study design

- Data was collected from January to May 2024 at UACAM. The students completed the instrument Test “Evaluating Leadership”. In total, 56 students completed with a response rate of 100%.

Data collection and processing

- The technological tool used to implement the data collection instrument was Google Forms. This allowed the digital survey to be distributed via email; After its application, the data is stored directly in a spreadsheet for analysis.

RESULTS

The students of the last semester of Computer Systems Engineering met in the Computer Room at the University facilities to answer the digital survey on Google Forms

Figure 2 shows the data collected in the field research, highlighting the maximum values obtained in each leadership style per respondent.

Box

Visionary	*Coach*	*Conciliator*	*Democratic*	*Exemplary*	*Dominant*	*Visionary*	*Coach*	*Conciliator*	*Democratic*	*Exemplary*	*Dominant*
8	**10**	9	8	**10**	9	**14**	**14**	**14**	13	13	13
14	13	11	11	12	10	**13**	12	**13**	**13**	11	9
10	**12**	11	**12**	11	**12**	14	**15**	14	13	10	9
11	10	**11**	**11**	9	8	**12**	**12**	**12**	9	11	12
9	12	**14**	10	11	12	**12**	**12**	**12**	**12**	**12**	11
14	**14**	11	12	12	7	13	8	**14**	13	9	8
12	9	12	12	**14**	7	12	9	**13**	12	8	7
12	**12**	11	**12**	11	**12**	**14**	12	13	13	10	10
11	9	12	9	**13**	12	12	11	**13**	11	11	12
12	9	12	**13**	12	11	**15**	**15**	13	**15**	14	**15**
13	**13**	11	12	9	12	12	11	11	**14**	9	**14**
10	9	**13**	11	11	12	**13**	9	9	12	7	9
10	10	**12**	10	11	11	11	11	**13**	12	10	11
10	**13**	**13**	10	9	10	**13**	10	**13**	12	10	8
12	12	**13**	12	11	10	**13**	10	11	12	11	**13**
10	**12**	11	10	7	11	**12**	**12**	**12**	11	11	9
11	**12**	10	11	11	9	5	**7**	3	5	6	4
10	10	**12**	11	**12**	10	**15**	**15**	**15**	**15**	14	**15**
13	10	10	9	8	14	**13**	10	**13**	11	7	8
12	13	11	**14**	13	10	**12**	**12**	11	**12**	11	9
13	**13**	9	**13**	**13**	12	9	**12**	9	8	11	12
12	11	9	**13**	11	**13**	5	6	5	3	**7**	**7**
13	10	10	11	**13**	12	12	9	12	**13**	11	7
13	**14**	13	12	10	11	**13**	10	10	9	12	10
11	**13**	12	**13**	**13**	11	**11**	9	**11**	**11**	**11**	**11**
10	10	**13**	12	12	**13**	**12**	**12**	**12**	**12**	**12**	**12**
11	11	12	10	**13**	**13**						
11	11	12	**14**	10	15						
11	12	11	**14**	8	12						
13	**13**	**13**	**13**	10	12						

Figure 2

Dan data collected in the field research.

Own Source.

RESULTS

Table 2 shows the items to evaluate each of Goleman's learning styles.

Box

Table 2

Results UACAM. Daniel Goleman's Leadership Styles.

Leadership Styles	*Test Items*
Visionary	1 – 2 – 15
Coach	3 – 12 – 14
Conciliator	6 – 7 – 17
Democratic	4 – 5 – 13
Exemplary	8 – 9 – 18
Dominant	10 – 11 – 20

Own Source.

Figure 3 shows the predominant total of students for each of Goleman's leadership styles.

Box

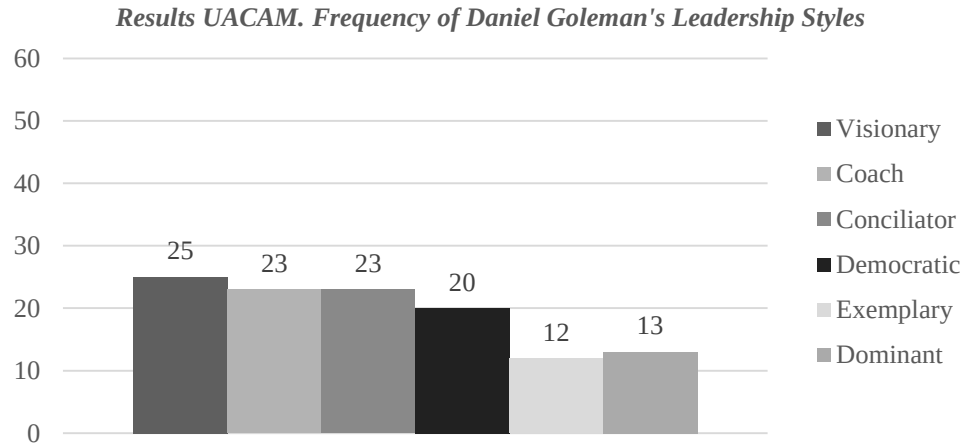


Figure 3

Results. Daniel Goleman's Leadership Styles.

Own Source.

RESULTS

- The findings of the research conclude that the predominant leadership style in CSE students is Visionary, obtained from 25 respondents out of a total of 56, equivalent to 44,64% of the sample. The Coach and Conciliator predominates in 23 respondents equivalent to 41,07%.

- With only 12 respondents being 21.42%, the Exemplary corresponds to the least significant leadership style in the sample. The Dominant leadership style is the second least prevalent, having only 23.21% with 13 respondents.

CONCLUSION

- The results showed that the most common leadership style among UACAM CSE students was the Visionary, which is characterized by a clear vision, the ability to motivate people, and align the team around a common objective. Although this is considered the most effective leadership style, less than 50% of the sample demonstrated it.

- No dominant leadership style was identified overall, suggesting the need for strategies to develop leadership as a soft skill during professional training. Leadership is essential in CSE, inviting students to experiment with different ideas and approaches. Despite the study's limitations, it highlights the potential for further research on leadership in CSE.

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