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Exploring Alternative Credentials for the Industrial Engineer

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Abstract: Nowadays, constant professional updating is essential, a tool to support this objective is the use of digital credentials, and which is also considered low cost. This exploratory research work shows a study carried out using surveys applied to Industrial Engineering and Administration degree students and graduates, regarding their knowledge and use of alternative credentials. It was found that 90.56% of those surveyed were unaware of the existence of alternative credentials, but once they knew about them, they showed great interest in their use and in incorporating them into their educational program. Likewise, 91.84% of the total respondents consider that alternative credentials are the future of education.

Keywords: *Alternative Credentials, Industrial Engineering*

1. Introduction

This research mainly seeks to know how related industrial engineers are to the concept of alternative credentials which are a representation of an achievement, interest or affiliation that is visual, available online, about an activity performed.

2. Objective

Determine how many students and graduates of the industrial engineering career know the term of alternative credentials and analyze their interest in them.

3. Hypothesis

More than 50% of the people surveyed do not know the concept of alternative credentials.

4. Theoretical Framework

2.1 Industrial Engineering

Almost all the activities that currently occur within an industry, in the past were not carried out, at least not as we know them today, at that time the industries worked thanks to some scientific knowledge that was had on chemistry, electricity, metallurgy, mechanics, etc., nor did the administration as it is known today., the success of a company depended completely on the skills of people for management, the manufacture of new products and machines was not carried out as it is done today, however, three great men changed the course of world history: Andrew Carnegie, Henry Ford and Frederick W. Taylor this thanks to their contributions and applications in engineering that are transcendent basically by the historical moment in which originated. With the Industrial Revolution, industry was born as such and, with it, all the inherent problems to make it work better and better. (Gabriel Baca U, 2014)

It is very interesting to analyze how the industrial engineer has evolved over the last decades in terms of his role in industry and society.

The Institute of Industrial Engineering defines industrial engineering as: "what concerns the design, improvement and installation of integrated systems of people, materials, information, equipment and energy, supported by specialized

knowledge and skill in mathematics, physics and social sciences that, together with the principles and methods of analysis of engineering and design, specify, predict and evaluate the results that will be obtained from each of the systems of the industry". (Gabriel Baca U, 2014)

Nowadays the industrial engineer oversees the structuring and design of the processes of a company. In the past he was regarded as a chief laborer, now he is seen as a process optimizer, manager, planner, etc. The industrial engineer focused on perfecting the designed production systems, later he realized that he had to work also on maintaining low levels of inventories, then he joined the areas of maintenance, statistical quality, and quality management to optimize them. (Gabriel Baca U, 2014)

Industrial engineering focuses on the improvement of the production chain and not only of the company. Despite looking to have achievements, you also need to have areas of opportunity in design, optimization, etc. Carefully comparing the profile of this engineer with that of decades ago, considering what he has achieved and what his performance is today, we can realize that there is a marked tendency to improvement and a constant desire to solve problems outside the physical limits of the company and it is something that is being achieved (Gabriel Baca U, 2014).

The general vision of contemporary industrial engineering is the training of professionals with the technical and managerial knowledge that allow them to plan, implement, design, operate, maintain, and control compresses that produce goods or services, but above all with a latent sense of commitment to society.

The industrial engineer must be trained to:

- Evaluate any condition related to safety, environment, and hygiene in the processes of production of goods.
- Systematically analyze work methodologies.
- Define the needs of financial, technical, and human to optimize services, through a total quality system for the products.
- Structure the costs of production processes.
- Create for all the teams of a company, a preventive maintenance system.
- Create quality programs, for the review of raw material, inventory in process and finished products. (Meza, 2015)

In addition to all these skills, professionals in today's labor market must be as competitive as possible, one way to increase and validate their knowledge is with so-called alternative credentials.

2.2Alternate digital credentials

Previously when you talked or mentioned that you were going to a course you thought of someone who went a certain period to a specific place, today, we know that you can take a virtual course without leaving the comfort of our home, thanks to tools such as the internet and websites that manage virtual courses. The need arises then through a change in the world, technology is in constant changes which forces us to be adapting more and more to new trends and be constantly updating ourselves, companies increasingly demand more skills and knowledge about practical topics, so we must prepare ourselves and what better way than to take advantage of the technology we have and all the sources of information that is increasingly accessible around the world. (Knowly, 2020)

Digital credentials are used to represent achievements in skills or awards earned online. According to Gibson, a digital badge is a representation of an achievement, interest, or affiliation that is visual, available online and contains metadata that includes links that help explain the meaning of the context, process, and outcome of an activity. (David & Nathaniel, 2013).

They are rich in data that can be shared within an open network of organizations and individuals backed by an agreed-upon open infrastructure. Open infrastructure is a series of agreed standards that define how each credential should be created, what information should be contained and how it should be stored and shared. (Zui, Sunnie Lee, & Timothy James, 2018)

David Gibson mentions that there are four key areas in education regarding the advantages of alternative credentials:

- Motivation

  The acquisition of digital credentials motivates students to continuously perform online activities, designed to support them and achieve the expected learning outcomes. A good platform that displays available credentials, as

signs of potential achievement, also provides users with information about opportunities for further learning, forming a path forward for achievement and making it more accessible to the learner.

- Recognition

  Because credentials grant validation and accreditation, a status recognition is obtained. Digital badges in education can provide a direct link to evidence needed to pass a unit, graduate from a program, or get a job. Because of the direct links to evidence of learning and achievement, there is considerable flexibility regarding skills that can be recognized and legitimized through digital badges. For example, skills such as entrepreneurial thinking and social skills, which are not normally recognized in college degrees and professional credentials, could be backed up by a credential that signals a video of those skills in action. Therefore, a digital credential can represent a new type of measure and method for displaying achievements.

- Evidence of achievement

  Evidence of achievement is achieved through a direct link to digital credentials that provide evidence of knowledge, capabilities, and achievements. In addition, the means to assess such evidence can be made more transparent through credential metadata. Accredible (accredible.com) is an example of an online resume where a rating system attached to a badge allows viewers to assess its value.

- Research implications

  Digital badges provide several new possibilities for education that require additional research. Points, badges, and leaderboards are gamification elements that are making their way into educational practice. For example, students may compete with others, or with a self-imposed goal of gaining more knowledge and the reputation that accompanies them from a series of badges while learning. (David & Nathaniel, 2013).

According to a survey conducted by Jay R. Fajiculay, students have the following opinion about alternative credentials:

Most respondents (82%) answered that they are proficient in the use of technology. 62% agreed that obtaining digital credentials would allow them to share achievements with future employers, that potential employers would view positively the badges earned in this course (57%) and that they would display digital badges on professional networking sites such as LinkedIn (68%). However, only 18% agreed that they would display digital badges on social media sites like Facebook®. With respect to the previous use of digital credentials, approximately half (47%) of respondents agreed that they had previously registered or completed an activity to obtain a digital credential. (Jay R, Bhavini T, Casey V, & Amy Heck,2017)

Existing research on digital credentials provides insight into the impact of credentials on people's levels of participation in certain activities. In one study, for example, a credential-based achievement system was introduced into an online learning tool used by college students. It was a randomized controlled experiment involving more than 1,000 students that found evidence of the positive impact of badges on student engagement levels. Specifically, badges increased the number of student contributions and the time they participated without decreasing the quality of their contributions. In a separate experimental study investigating the effects of assigning editing awards or "big stars" to contributors to Wikipedia contributors, Restivo and van de Rijt (2012) found that receiving large stars increased the productivity of the experimental group by 60% compared to the control group. Other research has produced more mixed results and suggests that the motivational effects of badges may vary depending on the interactions between the individual, the activity and the type of badge awarded. Together, these studies do not seem to support the fears expressed by some that badges will decrease levels of intrinsic motivation by emphasizing extrinsic rewards. Instead, they support a situational perspective of motivation, in which extrinsic and intrinsic motivation plays a role in supporting meaningful participation in a learning activity. (Katie & Simrat, 2015)

Another advantage in addition to the motivation of students and that goes hand in hand, are the costs, nowadays a better preparation entails in a high cost either a course or a certification according to (Hickey, 2016) schools and universities have recognized that digital records can reduce the costs associated with printing, sending, receiving, verifying, processing, and storing paper credentials. This could help those who do not have many resources to pay for something physical, in addition to having the advantage that once acquired a course, be it a video or digital material, it can be reproduced as many times as necessary in case it is required, this unlike a face-to-face class where most of the knowledge acquired, will depend on your notes.

5. Methodology

An exploratory and quantitative research was carried out, which had as a method the survey of alternative credentials for the industrial engineer, in which both students and graduates answered, was carried out through the Microsoft Forms platform to later analyze the data in Microsoft Excel. A sample of 233 students and graduates of industrial engineering was considered.

6. Results

The results of our survey show that participants are 17-22 years old, 58% of respondents are women and coinciding with age they are all students who are studying a semester of the bachelor's degree, of which 90% do not know the term of alternative credential.

43% of respondents have not worked, 45% have not been offered an alternative credential and 12% have already been offered and taken.

69% do not know sites to receive online certifications, the other 31% with people who do know somewhere to receive online certifications, shows that the most popular site among respondents is Khan Academy, although there are sites that approach it such as Coursera and Udemy (Table 1).

Table 1. Websites for better known alternate credentials

Website	Votes
Khan Academy	39
Coursera	38
Udemy	31
Linkedin Learning	24
EDX	18
Google Activate	15
IETM	12
Other:	9

98% of respondents are willing to take a credential for their own taste, and 69% would like to acquire additional knowledge, most of them would be willing to pay between 500 and 1500 pesos for accreditation (Figure 1).

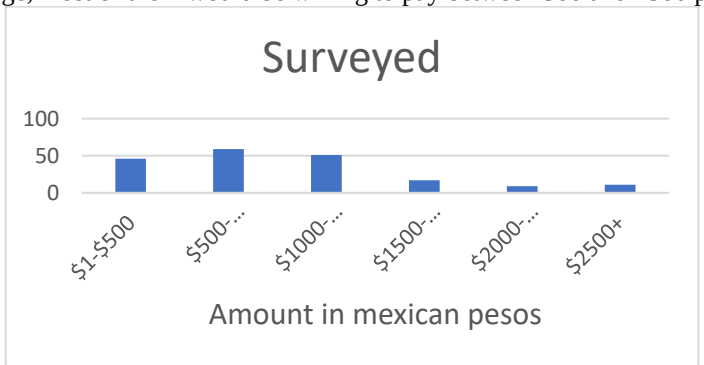

Figure 1. *Money those respondents are willing to pay for an alternative credential*

96% of people would be willing to learn topics unrelated to their career and the most popular topics to learn are business, languages and computer science, their votes 77, 43 and 32 respectively.

78% of respondents have 1 to 5 hours per week to take a credential, and only 11% already have a credential of this type.

Of the respondents who have already completed a credential, 46% think that online and face-to-face credentials are just as efficient (Figure 2), and 92% of all respondents believe that alternative credentials are the future of education.

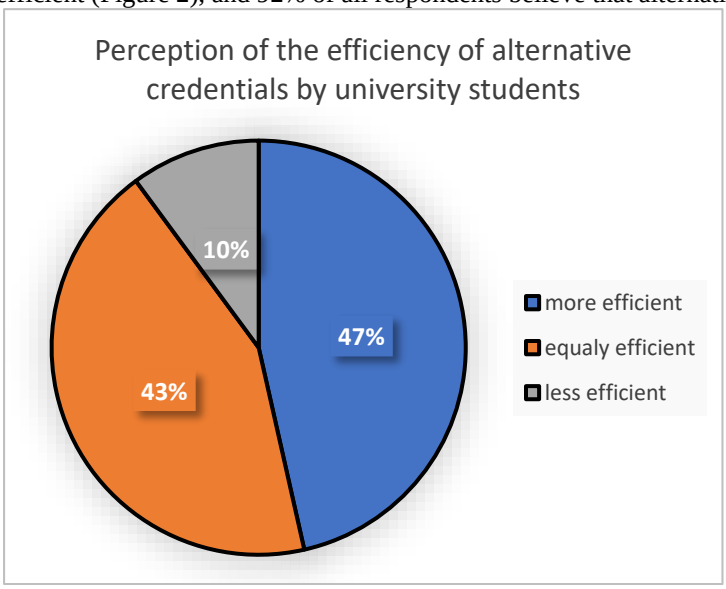

Figure 2. *Perception of respondents who have taken an alternative credential against university classes.*

1. Conclusions

With the results obtained we can verify the hypothesis raised, 90% of the respondents do not know the concept of alternative credentials. However, once they shared the meaning, there was a lot of interest in getting some credential from the interviewees, they also agree that they are a trend of the future, they would like their university career to include them as part of the educational program and they would also be interested in it being a topic not related to their career, which would help to better complement the students in their professional training.

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