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Exploring the SOLIDWORKS® Certification Program

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Exploring the SOLIDWORKS® Certification Program

Abstract

The number, variety, and acceptance of computer-aided design (CAD) certifications has significantly increased over the last decade with minimal research conducted on their impact. The purpose of this research paper is to describe the perceived value and benefits of the SOLIDWORKS certification program for students and working professionals within the United States SOLIDWORKS community. The SOLIDWORKS certification program, which began in 1998, recently surpassed 500,000 certified users worldwide. It is viewed as a supplier of world-wide, industry-recognized, lifelong nonconforming professional certifications. Survey data from 193 individuals across five geographical regions of the United States indicate that a SOLIDWORKS certification is valuable and provides benefit to the certified user. This paper presents a novel method of data collection, provides details concerning the actual value and benefits of certifications, and discusses areas of future research as it relates to CAD certifications.

Key Words: SOLIDWORKS, Certification, Computer-aided design (CAD)

Introduction

There are more than 6,700 different industry-recognized certifications [1], 43 million Americans (16.9% of the population) hold a professional certification or license [2], and over 500,000 individuals have been awarded a SOLIDWORKS certification [3]. “Yet many employers, workers, students, policymakers, and education and workforce development practitioners know little about the use and value of certifications” [4, p. 3].

Certifications, one of the many terms under the credential umbrella (certificate, badge, degree, license), have grown in diversity, complexity, and popularity. Some certification programs are often viewed merely as a revenue generating or marketing mechanism while others award certifications that “have the potential to be useful tools in addressing re-employment, re-deployment, and re-education challenges that workers face in the current labor market” [4, p. 3]. “Enormous economic shifts predating and accelerated by the current worldwide pandemic caused by COVID-19, and the growing awakening to racial inequities in the U.S. are creating a labor market in which the use of certifications has the potential to grow” [4, p. 5]. Certifications serve varying purposes based on the stakeholder; however, generally can offer the following benefits:

- Decrease in onboarding and training time
- Increase in hiring marketability
- Increase in prestige, wages and/or promotions
- Increase in professional development opportunities

All certifications are not of the same quality, prestige, and/or conform to commonly accepted/published definitions. According to Workcred, an affiliate of American National Standards Institute (ANSI):

> Certifications are credentials awarded by certification bodies—typically nonprofit organizations, professional associations, industry/trade organizations, or businesses—

> based on an individual demonstrating, through an examination process, that she or he has acquired the knowledge, skills, and abilities required to perform a specific occupation or job. Depending on the certification body, they may be called industry or professional certifications. Although training may be provided, certifications are not tied to completion of a program of study as are certificates. They are time limited and may be renewed through a recertification process. In addition, some certifications can be revoked for a violation of a code of ethics (if applicable) or proven incompetence after due process [4, p. 4].

The Bureau of Labor Statistics (BLS), working with the federal Interagency Working Group on Expanded Measures of Enrollment and Attainment (GEMEnA), further clarifies the difference between licenses and certifications through the issuer of the credential. "Certifications are issued by nongovernmental certification bodies, whereas licenses are awarded by a federal, state, or local government agency. Thus, licenses convey a legal authority to work in an occupation, while a certification on its own does not" [2, p. 1].

The SOLIDWORKS certification program began in 1998 with the release of the Certified SOLIDWORKS Professional (CSWP) certification. The computer-aided design (CAD) certification is a world-wide industry-recognized credential obtained when an individual passes an interactive exam which tests a users' knowledge, skill, and ability (KSA) with SOLIDWORKS, a CAD program created and sold by Dassault Systèmes and/or a general engineering related topic, such as additive manufacturing or sustainability. Over the following decades the program grew in popularity, accessibility, and diversity. In 2019, the program was merged with the 3DEXPERIENCE certification system, which includes other software packages within Dassault Systèmes's portfolio (e.g. CATIA, SIMULIA, DELMIA) [5]. As of September 7, 2021, over 20 different certification exams are available and over 500,000 users certified [3].

Based on the definition given above by Workcred and the BLS, the certifications awarded under the SOLIDWORKS certification program would not be classified as a certification as SOLIDWORKS certifications do not have a stated revocation process and required recertification requirement. However, when using Workcred's diagram which classifies a certificate, certification, degree, and license [6]; they would not meet all criteria for any credential listed. The authors would like to propose that certifications should be further categorized as either high- or low-quality and/or conforming or non-conforming. Recently Workcred has defined industry-recognized certificate or certification as a credential developed in consultation with industry professionals [7]. For the purposes of this paper, the SOLIDWORKS certification program will be viewed as a supplier of world-wide, industry-recognized, lifelong nonconforming professional certifications.

"There are very few empirical studies that exist to provide evidence of either 1) supporting the positive benefits of a CAD certification or 2) establishing that a certification does not provide value to the holder" [8, p. 5]. As the SOLIDWORKS certification program continues to grow in acceptance with schools and industry, research exploring how their certifications impact hiring decisions, promotions, salaries, etc. is needed. Additionally, variations amongst geographic regions needs to be explored.

Purpose

The purpose of this research paper is to describe the perceived value and benefits of the SOLIDWORKS certification program for students and working professionals within the United States SOLIDWORKS community.

Definitions

This research paper supports the following definitions for terms used within. They are provided in an attempt to provide further clarification and accuracy when describing the research.

- Computer-Aided Design (CAD) *(v or n) computer-aided drafting, computer-aided design, or computer-aided design/drafting.* The usage depends on the context in the design process and on whether the acronym refers to the physical computer system or the activity of using such a system to support technical and engineering graphics [9]
- CAD Software *(n) CAD program*. Software that replaces manual drafting with a digital process using computer technology, such as SOLIDWORKS, Inventor®, Fusion 360®, Solid Edge®, Creo®, or Onshape® [10]
- CAD Certification *(n) CAD certificate*. Industry recognized credentials obtained by passing interactive online or in-person exams that test an individuals' competency in the use of a specific version of CAD software [11]
- User *(n)*. An individual who currently has or has had experience with CAD, CAD software, and/or CAD certifications
- Value *(n)*. Relative worth, utility, or importance [12]
- Benefit *(n)*. Something that produces good or helpful results or effects [12]

Methodology

The research design was a cross-sectional survey study of SOLIDWORKS users located in the United States from 2017 to 2020. The online survey was distributed via a hyperlink in a LinkedIn® InMail™ message. The survey consisted of closed-ended (i.e., yes/no) and open-ended questions (i.e., short answer) as well as rank order questions. Survey distribution took place by geographical regions (see Table 1). Respondents from each region had on average 34 days to complete the survey.

Prior to sending the survey, a target sample database was created from a population of certified SOLIDWORKS users using the 3DEXPERIENCE® Certification Center (https://3dexperience.virtualtester.com/#home). The web portal allows anyone to validate a certificate, search for certified users or certified resellers, and/or find training centers. The database was filtered to include individuals who, 1) displayed their public LinkedIn profile on the Certification Center, 2) were working professionals employed in an engineering-related field, and 3) had earned, at minimum, a CSWP certification. Students, educators, and SOLIDWORKS employees and resellers were excluded in an attempt to reduce survey bias.

Table 1: Geographic Regions

Geographic Region	*States Included*
Midwest	IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI, KY
Northeast	CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT
Southeast	AL, AR, FL, GA, LA, MS, NC, SC, TN, VA, WV
Southwest	AZ, NM, OK, TX
West	AK, CA, CO, HI, ID, MT, NV, OR, UT, WA, WY

Results

The descriptive research study surveyed 780 individuals (643 CSWPs and 137 CSWEs) located within the United States, of which 193 (24.74%) provided some feedback (answering all questions was not mandatory) and met all inclusion criteria. The respondents were primarily educated (unlicensed) white males between the age of 26 to 54, who worked for corporations in general engineering fields (see Table 2). Figure 1 shows the diversity and number of certifications held by the respondents and Figure 2 shows approximately when respondents attempted a SOLIDWORKS certification exam(s).

Results show that 88.89% of respondents perceive that, in general, a SOLIDWORKS certification is valuable (i.e., has relative worth, utility, or importance) and 73.40% perceive that the benefit(s) of obtaining a SOLIDWORKS certification(s) outweighs the exam cost(s). Respondents also indicated that, in general, the SOLIDWORKS Certification Program benefits (i.e., produces good or helpful results or efforts) students, more than Dassault Systèmes or industry (see Figure 3). Respondents generally perceived that the value of a SOLIDWORKS certification(s) exponentially declines with the number of years working as a professional (see Figure 4). Only 5 respondents indicated that there is no value for students while 50 indicated that there is no value for someone who has been an industry professional for 20 or more years.

Over 95% of the respondents perceive that, in general, a SOLIDWORKS certification is valuable during the hiring process (i.e., position posting, recruiting, interviewing, and/or etc.). From those 95%, their top three items of importance perceived during the hiring process were discovered. First, a SOLIDWORKS certification(s) demonstrates benchmark skills, second a SOLIDWORKS certification(s) displays interest in personal professional development, and third a SOLIDWORKS certification(s) reduces internal training and/or mentoring time (see Figure 5). However, concerning awards and merits received after passing a certification exam, over 75%, 60% and 70% have never directly received a bonus, salary increase, and promotion respectively (see Figure 6).

Table 2: Respondent Demographics

Category	*Count (%)*	*Category*	*Count (%)*
Gender		**Licensure status**	
Male	189 (98.44)	None	151 (78.65)
Female	3 (1.56)	Engineer-in-training	33 (17.19)
Ethnicity		Professional Engineer (PE)	6 (3.13)
White	164 (84.97)	Other	2 (1.04)
Black or African	3 (1.55)	**Professional experience (years)**	
Hispanic or Latino	10 (5.18)	Less than 1	1 (0.56)
American Indian / Alaska Native	1 (0.52)	1-3	20 (11.11)
Asian / Pacific Islander	13 (6.74)	3-4	14 (7.78)
Other	2 (1.04)	4-8	41 (22.78)
Age range (years)		8-10	27 (15.00)
18-25	15 (7.77)	10-15	34 (18.89)
26-34	82 (42.49)	15-20	19 (10.56)
35-54	84 (43.52)	20+	24 (13.33)
55-64	11 (5.70)	**Career field**	
65 and older	1 (0.52)	Arts & Entertainment	3 (1.56)
Education level		Construction	3 (1.56)
No degree	24 (12.43)	Other[1]	13 (6.78)
Associates	39 (20.21)	Engineering	173 (90.10)
Bachelors	99 (51.30)	**Geographical region (employer)**	
Masters	31 (16.06)	Midwest	56 (29.02)
Employment status		Northeast	29 (15.03)
For-Profit Company	184 (95.34)	Southeast	40 (20.73)
Self-Employed	9 (4.66)	Southwest	32 (16.58)
		West	36 (18.65)

Notes. [1]utilities, education, government, heath & medicine, transportation & warehousing, accommodation or food service, finance or insurance, IT, manufacturing, industrial design, etc.

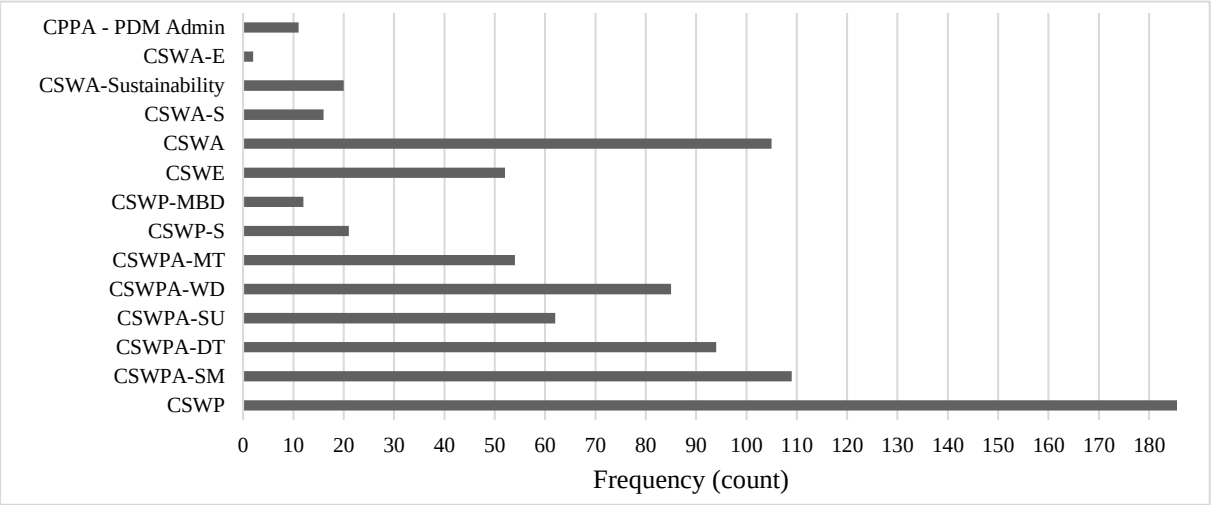

Figure 1*:* SOLIDWORKS Certifications Held by Respondents

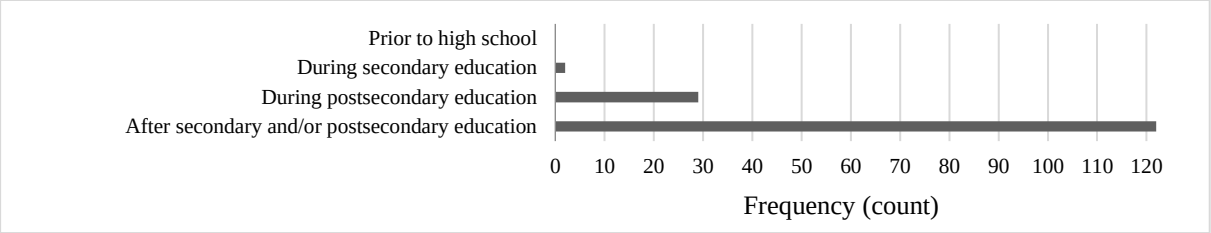

Figure 2: SOLIDWORKS Certification Exam Attempts by Respondents Over Time (Midwest region not included)

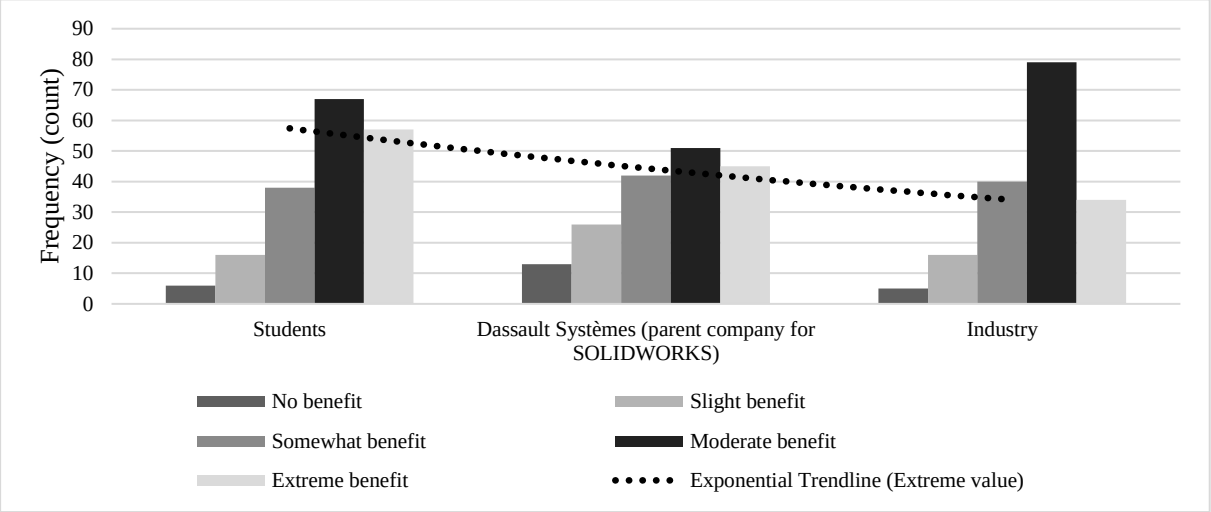

Figure 3: SOLIDWORKS Certification Program's Benefit Levels

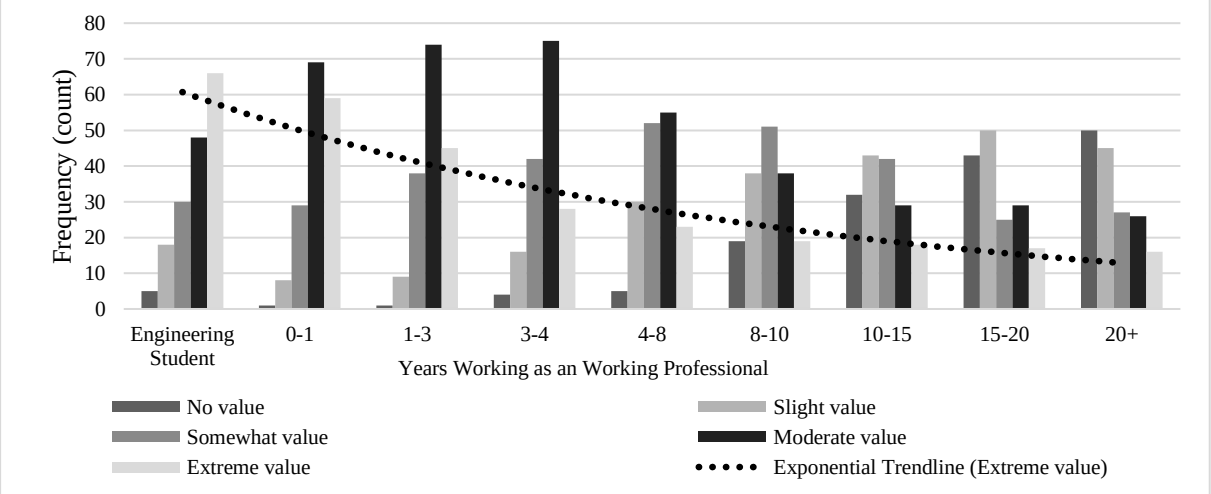

Figure 4: SOLIDWORKS Certification Value Over Years

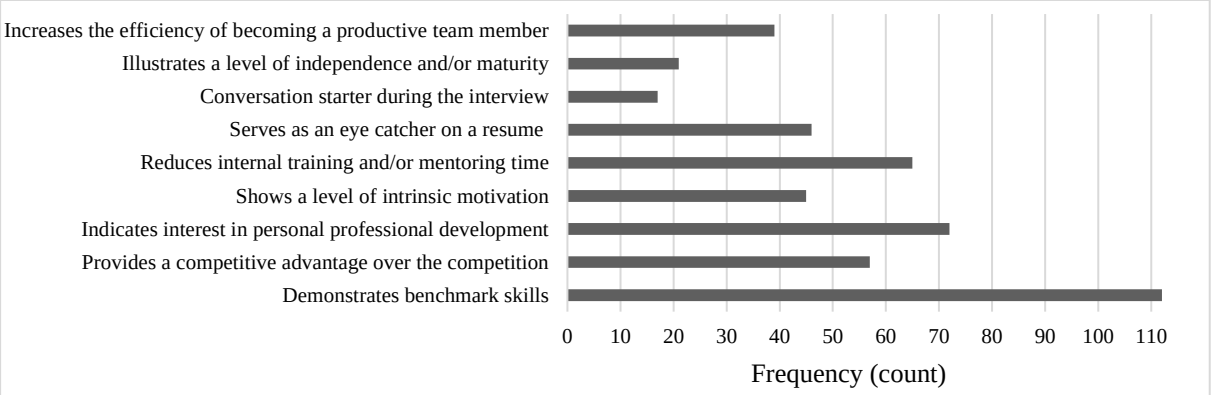

Figure 5: SOLIDWORKS Certification Value During the Hiring Process

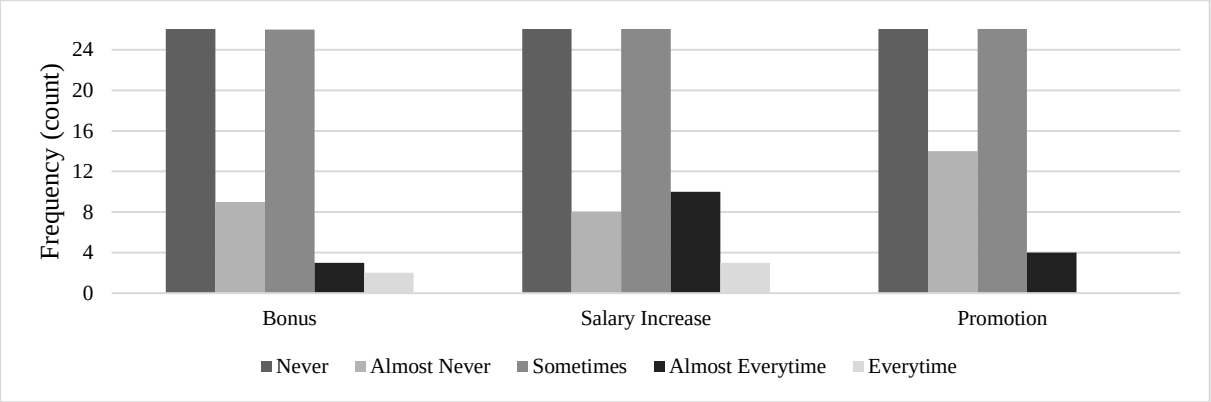

Figure 6: Work-Related Rewards or Merits Received After Passing a SOLIDWORKS Certification Exam

Discussion

The results of this research reveal geographic (see Table 1) commonalities related to the value of obtaining a SOLIDWORKS certification within the United States. Overall, a high percentage of respondents (88.89%; 168 out of 189) from the 5 regions indicated that a SOLIDWORKS certification is valuable. The Midwest region had the highest percentage (92.86%; 52 out of 56) while the Northeast region had the lowest percentage (82.14%; 23 out of 28). One respondent from the Midwest stated, “most people today recognize the certification program given by Solidworks and it comes with a lot of respect from your colleagues within your work environment and the Solidworks Community.” To be clear, the authors are not suggesting that obtaining a SOLIDWORKS certification replaces the need for practical design and engineering skills. This sentiment is supported by a respondent from the Northeast that said, “yes there are benefits to obtaining certain certifications, but they also do not prove that a person knows the software (or how to design) through and through.” Based on these results, obtaining a SOLIDWORKS certification is recognized as an important achievement and provides worth to the certified user.

To narrow the focus on the value of earning a SOLIDWORKS certification, results also reveal a high percentage of respondents (95.27%) indicated that a SOLIDWORKS certification is valuable during the hiring process. A respondent from the Midwest reported that, "the Solidworks Certs kick started my career" and "I have not had any issues finding employment since I received the certification in 2011."

The geographic commonalities demonstrating that achieving a SOLIDWORKS certification is valuable can be seen as positive. However, other demographic commonalities have emerged which indicate a lack of diversity within the engineering workforce. The first area illustrating lack of diversity is in the respondents' sex. The majority of respondents (98.44%; 189 out of 192) identified as male and only 1% (3 out of 192) identified as female. It is well established that females are underrepresented within science, technology, engineering, and mathematics (STEM) fields and further research is needed to understand the benefits of obtaining a SOLIDWORKS certification for females. Future research questions raised as a result of this data include:

- Why are females underrepresented in STEM fields, specifically the engineering community?
- Is obtaining a SOLIDWORKS certification valuable for females?
- Does a SOLIDWORKS certification hold a different value for females than males?

The second area which demonstrates a lack of diversity is in the respondents' ethnicity or race. The majority of respondents (84.97%; 164 out of 193) identified as being of white ethnicity/race. The two closest ethnicities represented in the study were Asian/Pacific Islander and Hispanic or Latino which were 13 (6.74%) and 10 (5.18%), respectively. This research data potentially indicates that the engineering workforce is dominated by white males. Future research is needed to explore ways to recruit and retain a diverse engineering workforce. Future research questions raised as a result of this data include:

- How can the engineering community recruit and retain a diverse engineering workforce?
- Is obtaining a SOLIDWORKS certification valuable for those individuals that are of an ethnicity other than white?
- Does a SOLIDWORKS certification hold a different value for those individuals that are of an ethnicity other than white?

While most respondents feel that obtaining a SOLIDWORKS certification is valuable, there were a few respondents indicating that it was not valuable. Comments provided by respondents suggest that certifications are too easy, certifications are less important than design skills, and certifications are not recognized as a valid credential. Ultimately, based on the data, the authors feel confident in stating that earning a SOLIDWORKS certification is valuable within the United States. These findings are important as individuals consider the time, effort, and money involved in pursuing a SOLIDWORKS certification.

Limitations

The authors acknowledge that certain limitations apply to the collection of data regarding the value of SOLIDWORKS certifications. When possible, the authors attempted to reduce the number of limitations for this study. This research represents a small, sub-section of a larger community of both SOLIDWORKS users and certified SOLIDWORKS users. The survey from which this data was collected was sent to those certified SOLIDWORKS users that 1) allowed

their SOLIDWORKS certification results to be listed in the SOLIDWORKS certification database, 2) connected their certification results to their LinkedIn profile, 3) connected with the authors via LinkedIn, and 4) responded to the survey. Not all certified SOLIDWORKS users have their certifications results listed on the certification center nor is there any relationship between their SOLIDWORKS certification and their LinkedIn profile, unless specified by the user. The connections and users that responded to the survey are those that specified their location as within the United States. SOLIDWORKS computer-aided design (CAD) software is used globally and results from this survey may be limited to perceptions within only the United States and may or may not represent the opinions of users outside the United States.

Conclusion

CAD certifications have increased in popularity within the last five years and will continue to gain momentum as people utilize the achievement as proof of a valuable credential and/or skill. As producers of CAD software continue to increase the number and variety of certifications, it will be important for numerous communities (e.g. education, engineering, design, CAD, etc.) to stay abreast of the current offerings and their potential impact(s). The authors posit that achieving a SOLIDWORKS certification is valuable and that certifications offered by other CAD software producers, other than SOLIDWORKS, are also most likely valuable; however, future research is needed in this area. Specifically, the value and benefits of certifications offered by Autodesk, Parametric Technologies Corporation (PTC), and Siemens should be researched. Future research needs to be conducted to (1) corroborate the value of SOLIDWORKS certifications as part of a global context and not specifically limited to the United States, (2) understand the number of global users for each specific CAD software and the value of those certifications on a global scale, and (3) isolate and identify the tangible benefits of achieving a CAD certification. Educators at all levels need to understand the various types of certifications, identify the certifications that best prepare students for the job market, and prepare students to achieve the status of certified. Industry personnel also need to understand the various types of certifications, identify those certifications that are most applicable to job performance, and create an incentive for employees to increase their skills through certifications.

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