

Computer Programming Competencies Required by Computer Education Graduates for Sustainable Employment

Ibezim, Nnenna Ekpereka¹ & Chukwujekwu Ijeoma Chibuogwu¹

¹ Department of Computer Education, University of Nigeria Nsukka, Nsukka, Nigeria

Correspondence: Ibezim, Nnenna Ekpereka, Department of Computer Education, University of Nigeria Nsukka, Nsukka, Nigeria. E-mail: nnenna.ibezi@unn.edu.ng

Received: September 20, 2016

Accepted: September 29, 2016

Online Published: April 9, 2017

doi:10.5539/res.v9n2p106

URL: <http://doi.org/10.5539/res.v9n2p106>

Abstract

This study identified the computer programming competencies required of computer education graduates for sustainable employment in Enugu metropolis, Enugu state, Nigeria. Three research questions and one null hypothesis guided the study. The study adopted descriptive survey research design. The population for the study was 95, which comprised of 74 computing lecturers, 6 IT programming instructors, and 15 programmers. A structured questionnaire was used for data collection. The instrument was face validated by three experts in computer programming. Cronbach Alpha statistic was used to determine the internal consistency of the instrument, yielding reliability co-efficient of 0.83. Mean and Standard deviation were used to answer the research questions while ANOVA statistic was used to test the hypothesis. The study found out that 25 hard competencies, 18 business competencies, and 19 soft competencies are required by computer education graduates for sustainable employment in programming jobs. These competencies identified include among others, ability to code, test and debug programs quickly and efficiently; ability to explore and evaluate application design considerations for multiple technologies, ability to analyze users' needs and specifications then design, test, and develop software to meet those needs, ability to recommend software upgrades for clients' existing programs and systems, proficiency in data mining, confidence in personal ideas but open to feedbacks, adapting to changes while remaining focused on project with topmost priority and good sense of judgment. It was therefore recommended that the identified competencies should be incorporated in the curriculum for training Computer Education graduates for sustainability in programming jobs.

Keywords: computer programming, sustainability, employment, competency, Computer Education graduates

1. Introduction

Computer programming is indispensable in a technological era. Computer programming, as a course of study, is the study of basic programming concepts including algorithm and algorithmic tools, error types, debugging, data structure, different computer programming languages (low level and high level) and the likes. As an art, computer programming involves writing useful, maintainable and extensible source code (program) which can be translated by a program translator to perform a meaningful task. Computer programming helps one understand computers, or rather, gain more knowledge about how a computer works. According to Oommen (2014), computer programming makes it possible for computer users to interact with computerized machines and computers, harness the power of computing in all human endeavors, automate tasks and create intelligent machines. Based on this setting, computer programming is the art of writing computer programs that can run on various platforms including operating systems, the internet, handheld gadgets, computer-aided devices, or a combination of computer equipment. Computer programming is one of the core courses undertaken by computer education students, to enable them fit well and compete favorably with others in the IT industry.

Computer education graduates are individuals that are trained on the theories, practices and philosophical paradigms of the profession (computer education). Computer education graduates are trained to occupy teaching and leadership positions in secondary schools, technical schools, Colleges of Education, universities, and training programmes in Innovative Enterprise Institutes. They are also trained to be self-employed or work in software development firms, industries, and other allied occupations/parastatals, hardware maintenance firms, Information Technology (IT) firms. Computer education graduates need to be made to understand the implications of the recent trend in programming languages. At a more fundamental and personal level, according

to McGettrick, Boyle, Ibbet, Lloyd, Lovegrove and Mander (2004), computer education graduates need to recognize that the currency and the quality of their programming skills, and their competency levels, will be significant determinants of success throughout their careers. The implications of this according to the authors are to instill in computer education students at initial stage, high levels of appropriate and useful programming skills; to provide students with the competencies (skills, knowledge and attitude) required to learn and to know how to improve learning so that they are able to stay up-to-date ever more efficiently and effectively. Furthermore, there needs to be an infrastructure to support computer education graduates as they advance through their careers. Computer education graduates should be trained in such manner that at the point of graduation, they are far more equipped with all the necessary competencies required to fit well and progress in the chosen computer programming skill.

Competency is a measurable pattern of knowledge, skills, abilities, behaviors, and other characteristics that an individual needs to perform work roles or occupational functions successfully (Sturgess, 2012). Competency describes the actions that lie behind successful performance. It enables the instructor to substantiate that the learner has learned what was intended in the learning objectives or learning experiences. Competency description show an employee the level of knowledge and skill mastery required to successfully perform job duties, and the behavior standards that must be consistently demonstrated. Computer education graduates can also use competencies to plan a career path. Knowing the competencies that are critical for gaining and sustaining employment and certain promotions allow computer education graduates seek out and undertake relevant extra curriculum training and development opportunities. The acquisition of appropriate competency set puts an individual an edge above others, enhances one's job performance/output and chances of securing a job, being promoted, and sustaining an employment.

Sustainable employment is a way of building resilience to cope with future shocks and enable future transitions and advancement at work. An employee's level of job sustenance shows how relevant the person has been on the job. The ability to sustain an employment depends on the currency and quality of the competency set possessed by the employee. Sustainable employment depends on an employee's ability to meet the hard, business and soft competences of the employer. Sustainable employment addresses incompetency and low skills, facilitates career transitions, achievement of inclusive growth, and helps overcome poverty and unemployment. In the context of this study, sustainable employment is the ability of an employment to be sustained for an indefinite period of time.

Computer programming is one of the highly demanded lucrative skills in this IT era. The job market for programmers is readily available. The current computer programmer drought shows that there are far more jobs that require programming skills than people who have those skills. This could be attributed to the disparity between what is being taught at school and the actual programming practice which deskills a computer education graduate at the point of graduation.

There seems to be incongruence between the market demand for computer education graduates with requisite programming competencies and the programming curriculum content of computer education students at tertiary level of education in Nigeria. Hence, there is a gap between the programming competencies computer education graduates learned in school and what IT employers expect them to know. This may be because computer education lecturers lack the programming competencies required to solve today's computer programming problems, lack of stipulated competences and competencies for computing lecturers and students to work it, lackadaisical attitude on the part of the student and inability of schools to get the latest programming competencies (from the industries) expected of computer education graduates. Tragic, too, is the increasing rate of unemployment, laying-off of deskilled programmers in the IT industry and gradual deskilling of computer education graduates as a result of emergence of new programming languages and technologies, among others. These ugly issues raise doubt on the programming competencies taught to students while in schools. It is against these backdrops that the researcher seeks to ascertain the competencies required by computer education graduates on computer programming for sustainable employment in Enugu metropolis of Enugu state.

1.1 Purpose of the Study

Specifically, this study sought to ascertain the:

- 1) Hard competencies required by computer education graduates on computer programming for sustainable employment;
- 2) Soft competencies required by computer education graduates on computer programming for sustainable employment;

3) Business competencies required by computer education graduates on computer programming for sustainable employment.

1.2 Hypotheses

Computing lecturers, IT programming instructors and programmers do not differ significantly in their opinion on the competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis of Enugu state.

2. Materials and Methods

The study adopted a descriptive survey research design with a purpose to explore respondents' opinion on the competencies required by computer graduates on computer programming for sustainable employment. This is in line with the view of Osuala (2011) that descriptive survey focuses on people's beliefs, opinions, attitudes, motivation and behaviours. The author stated that through survey, researchers identify present conditions, prevailing needs as well as provide information on which to base sound decision. The study was conducted in Enugu Metropolis of Enugu state, Nigeria, with focus on the tertiary institutions, IT Innovative Enterprise Institutes and IT firms. The population for the study consisted of ninety-five respondents. This comprises of 74 lecturers, 6 IT programming instructors and 15 programmers.

A structured questionnaire was used to elicit information from the respondents. The instrument contained two parts. Part I dealt with the demographic characteristics of the respondents. Part II contained 63 competency items made up of 25, 19 and 19 items in three clusters A, B and C respectively. The instrument was subjected to face validation by three experts, one from a university and one each from an IT Innovative Enterprise Institute and an IT firm. Four response options; Highly Required (HR), Required (R), Slightly Required (SR) and Not Required (NR) were used in the instrument. Cronbach Alpha was used to determine the internal consistency of the items in the instrument and a coefficient reliability of 0.83 was obtained indicating a high consistency. The instrument was administered to the respondents by the researchers and 84% of the copies of the instrument administered were retrieved.

Data collected were analyzed using mean and standard deviation to answer the research questions while ANOVA statistics was used to test the null hypotheses at 0.05 level of significant. Any item with a mean value of 2.50 and above indicated that the competency is highly required. On the other hand, any item whose mean value was below 2.50 showed that the competency item is not needed. In testing the hypothesis, where the significance value of F-calculated was greater than the level of significance (0.05) at which the hypothesis was tested, then, there was no significant difference existing in the responses of the respondents and the hypothesis was upheld, otherwise, it was not upheld.

3. Results

3.1 Research Question 1

What are the hard competencies required by computer graduates on computer programming for sustainable employment?

The data for answering research question 1 are presented in Table 1.

Table 1. Mean rating and standard deviation analysis of the responses of computing lecturers, IT programming instructors and programmers on the technical competencies required by computer graduates on computer programming for sustainable employment

S/N	Competency Items Required	Mean	SD	Remark
1.	Ability to use the right kinds of tools in a problem.	3.89	0.40	Required
2.	Ability to see relationships among similar tools and group them algorithmically in a suite.	3.37	0.77	Required
3.	Ability to analyze the problem at hand.	3.69	0.62	Required
4.	Ability to build a variety of the field's concepts, procedures, models and diagrams (such as flowcharts) that instruct programmers how to write the software code.	3.30	0.70	Required
5.	Ability to use an existing algorithm and codes to solve similar problem.	3.49	0.65	Required
6.	Ability to correct a poorly developed algorithm and modify the codes to suit present problem at hand.	3.28	0.91	Required
7.	Ability to code, test and debug programs quickly and efficiently.	3.54	0.65	Required

8.	Ability to explore and evaluate application design considerations for multiple technologies.	3.05	0.78	Required
9.	Ability to analyze users' needs and specifications then design, test, and develop software to meet those needs.	3.46	0.73	Required
10.	Ability to document every aspect of an application or system as a reference for future maintenance and upgrades.	3.19	0.88	Required
11.	Ability to understand computer capabilities, limitations and use appropriate languages in order to design effective software.	3.32	0.78	Required
12.	Ability to provide support for the implementation and troubleshooting of application suite.	3.17	0.85	Required
13.	Ability to quickly source for quality information that is needed to develop final software.	3.14	0.89	Required
14.	Ability to monitor and help improve application performance levels.	2.92	0.81	Required
15.	Ability to demonstrate extensive experience in the application design and architectural competency.	3.22	0.98	Required
16.	Ability to use HTML and CSS in order to have some insight into web design and development.	3.35	0.75	Required
17.	Ability to use a native mobile platform (even if the application is built using another technique).	2.86	0.79	Required
18.	Ability to understand project development/management processes and understand how to track progress on tasks.	2.92	0.68	Required
19.	Ability to use Java Script as a shared logic layer between native experiences.	2.69	0.82	Required
20.	Ability to use a server side language, to create the entire chain from a front-end application through the API layer and to the back-end.	2.92	0.80	Required
21.	Ability to understand and apply contemporary software development cycle.	2.94	0.67	Required
22.	Ability to measure software quality needed for real time applications.	2.86	0.86	Required
23.	Ability to determine when to retire obsolete software.	2.76	0.96	Required
24.	Ability to utilize application design methodologies, tools and current techniques to convert business requirements and logical models into a technical application design.	3.22	0.98	Required
25.	Ability to review, analyze and modify programs efficiently.	3.54	0.65	Required
Cluster Values		3.20	0.77	Required

The results presented in Table 1 revealed that all the 25 hard competency items are required by computer graduates for sustainable employment in the IT industry with mean ratings and standard deviation between 2.69-3.89 and 0.40-0.98 respectively. A grand mean of 3.20 indicated that, generally, hard competencies are highly required by computer graduates on computer programming for sustainable employment. The standard deviation of 0.77 shows that the opinions of computing lecturers, IT programming instructors and programmers on the hard competencies required by computer graduates on computer programming, are almost the same.

3.2 Research Question 2

What are the business competencies required by computer graduates on computer programming for sustainable employment;

The data for answering research question 2 are presented in Table 2.

Table 2. Mean rating and standard deviation of the responses of computing lecturers, IT programming instructors and programmers on the business competencies required by computer graduates on computer programming for sustainable employment

S/N	Competency Items Required	Mean	SD	Remark
1.	Ability to monitor the project's progress to ensure that it meets standards and cost targets.	3.49	0.73	Required
2.	Ability to work with vendors and ensure that service level agreements and key performance indicators are met.	3.27	0.84	Required
3.	Ability to empathize with end users, understand the business conditions they work in, and design graphical user interfaces that are easy to learn and use.	3.35	0.79	Required

4.	Ability to analyze users' needs and then design software to meet those needs.	3.58	0.77	Required
5.	Ability to explain to their customers how the software works and answer any question that arises.	3.39	0.77	Required
6.	Ability to negotiate contracts.	3.00	0.91	Required
7.	Proficient in the use of foreign languages.	2.08	0.89	Required
8.	Must have acquired degree or certificate.	2.91	0.87	Not Required
9.	Ability to recommend software upgrades for clients' existing programs and systems.	3.00	0.75	Required
10.	Proficient in data mining.	2.57	0.70	Required
11.	Ability to motivate teammates.	3.22	0.85	Required
12.	Ability to manage crisis arising from software team differences and forge ahead to accomplish the task at hand.	3.16	0.76	Required
13.	Ability to organize conferences, symposia and seminars on contemporary software development issues and management.	3.11	0.84	Required
14.	Ability to work in accordance with the state regulations on security of software/users.	3.05	0.78	Required
15.	Ability to identify and fix the gaps in projects.	3.22	0.85	Required
16.	Ability to collaborate with other programmers during a bigger project or commercial software development.	3.22	0.85	Required
17.	Proficient in predictive modeling.	2.57	0.70	Required
18.	Proficient in prescriptive analysis.	2.57	0.70	Required
19.	Possess legal knowledge about software development.	3.00	0.91	Required
Cluster Values		3.03	0.80	Required

The data presented in Table 2 revealed that 18 out of the 19 business competency items are required by computer graduates for sustainable employment in the IT industry with mean ratings and standard deviation between 2.57-3.49 and 0.70-0.91 respectively. However, a grand mean of 3.03 showed that, generally, business competencies are highly required by computer graduates on computer programming for sustainable employment. The standard deviation of 0.80 shows that the opinions of computing lecturers, IT programming instructors and programmers on the business competencies required by computer graduates on computer programming, are very close to each other.

3.3 Research Question 3

What are the soft competencies required by computer graduates on computer programming for sustainable employment;

The data for answering research question 3 are presented in Table 3 below.

Table 3. Mean rating and standard deviation of the responses of computing lecturers, IT programming instructors and programmers on the soft competencies required by computer graduates on computer programming for sustainable employment

S/N	Competency Items Required	Mean	SD	Remark
1.	Ability to make presentations to management, co-workers and clients in some fashion.	3.27	0.84	Required
2.	Ability to manage co-workers and coach them.	3.11	0.70	Required
3.	Ability to align your value with the company's culture and policies.	3.14	0.80	Required
4.	Be confident in your ideas but open to feedback.	3.35	0.73	Required
5.	Ability to quickly adapt to changes while remaining focused on project with topmost priority (meeting deadlines).	3.49	0.73	Required
6.	Ability to create and innovate/initiate ideas outside of the box and putting it into action in order to achieve results.	3.41	0.80	Required

7.	Ability to analyze work processes, developing work processes and discover new ways to complete them efficiently within deadlines.	3.28	0.82	Required
8.	Possess good memory.	3.51	0.69	Required
9.	The ability to read, write and speak effectively.	3.35	0.82	Required
10.	Ability to forge strong relationships with different constituencies throughout the company.	2.84	0.96	Required
11.	Ability to provide mentoring and support to clients.	3.27	0.80	Required
12.	Ability to think critically.	3.46	0.69	Required
13.	Ability to work on many parts of an application or system at the same time.	3.00	0.88	Required
14.	Ability to work with high degree of meticulousness and a systematic approach to check and test along the way.	3.11	0.84	Required
15.	Ability to concentrate and pay attention to detail.	3.00	0.88	Required
16.	Ability to identify and articulate a problem.	3.46	0.69	Required
17.	Ability to effectively solve problems and face obstacles at work.	3.46	0.69	Required
18.	Ability to work side by side with team members.	3.27	0.80	Required
19.	Ability to concretize an abstract idea.	3.51	0.69	Required
Cluster Values		3.28	0.78	Required

The results presented in Table 3 revealed that all the 19 soft competency items are required by computer graduates for sustainable employment in the IT industry with mean ratings and standard deviation between 2.84-3.51 and 0.69-0.96 respectively. A grand mean of 3.20 indicated that, generally, technical competencies are highly required by computer graduates on computer programming for sustainable employment. The standard deviation of 0.78 shows that the opinions of computing lecturers, IT programming instructors and programmers on the hard competencies required by computer graduates on computer programming, are very close to each other.

Table 4. Summary of ANOVA analysis of the responses of computing lecturers, IT programming instructors and programmers on the hard competencies required by computer graduates on computer programming for sustainable employment

		Sum of Squares	df	Mean Square	F	Sig.	Remark
Cluster 1: Hard Competencies	Between Groups	0.062	2	0.031	0.321	0.728	NS
	Within Groups	2.134	22	0.097			
	Total	2.197	24				

Result on Table 4 showed the three groups with F-value of 0.321 and a Sig. value of 0.728 which was greater than the 0.05 level of significance, shows that the null hypothesis upheld. Hence, the inference drawn was that computing lecturers, IT programming instructors and programmers do not differ significantly in their opinion on the hard competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis of Enugu state, Nigeria.

Table 5. Summary of ANOVA analysis of the responses of computing lecturers, IT programming instructors and programmers on the business competencies required by computer graduates on computer programming for sustainable employment

		Sum of Squares	df	Mean Square	F	Sig.	Remark
Cluster 2: Business Competencies	Between Groups	0.586	2	0.293	1.995	0.176	NS
	Within Groups	2.352	16	0.147			
	Total	2.938	18				

Result on Table 5 showed the three groups with F-value of 1.995 and a Sig. value of 0.176 which was greater than the 0.05 level of significance, indicates that the null hypothesis was not rejected. Hence, the inference drawn was that the mean ratings of the opinions of computing lecturers, IT programming instructors and programmers on the business competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis of Enugu state, Nigeria are significantly the same.

Table 6. Summary of ANOVA analysis of the responses of computing lecturers, IT programming instructors and programmers on the soft competencies required by computer graduates on computer programming for sustainable employment

		Sum of Squares	df	Mean Square	F	Sig.	Remark
Cluster 3: Soft Competencies	Between Groups	0.006	2	0.003	0.079	0.782	NS
	Within Groups	0.656	16	0.041			
	Total	0.659	18				

Result on Table 6 showed the three groups with F-value of 0.079 and a Sig. value of 0.782 which was greater than the 0.05 level of significance, shows that the null hypothesis was upheld. Hence, no significant difference exist in mean ratings of the responses of computing lecturers, IT programming instructors and programmers on the soft competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis of Enugu state, Nigeria.

4. Discussion of Findings

The result of this study revealed that hard, business and soft competency items are highly required by computer graduates on computer programming for sustainable employment. This implies that for computer graduates in Enugu state to gain and sustain employment in computer programming, they need to effectively acquire a combined competency set of hard, professional and soft competencies. This finding is in corroborates with the study of Bailey and Mitchell (2007) who pointed that a heterogeneous mix of skills is needed by computer programmers. The finding is also in line with the opinion of Sharma (2008) who believe that good hard skills complemented with great soft skills are required by programmers. The finding is also in agreement with the statements of Tucker (2014), Javin (2014) and Weisfeld (2013) that computer programming requires a combination of many skills.

The finding revealed that 25 hard competency items were required by computer graduates on computer programming for sustainable employment. The result of the hypothesis showed the three groups with F-value of 0.321 and a Sig. value of 0.728 which was greater than the 0.05 level of significance. Since the Sig. value > 0.05 level of significance, the null hypothesis was upheld. Hence, it was inferred that computing lecturers, IT programming instructors and programmers do not differ significantly in their opinion on the hard competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis. This finding corresponds with the statements of Tucker (2014), Weisfeld (2013) and Sharma (2008) that the ability to use a native mobile platform, a basic agile development process and toolset, how to do effective estimations, Java Script, a server side language, Structured Query Language (SQL) and Hyper Text Mark-up Language (HTML); are some of the hard competencies that are required by programmers. Doyle (2015) and Strom (2014) who highlighted proficiency in a foreign language, a degree or certificate, ability to use the right kinds of tools, being able to build a mathematical model of the underlying processes, ability to follow the Open Source Software (OSS) code copy right attribution and notice rules; as the hard competencies a programmer should possess.

The finding revealed that 18 business competency items were required by computer graduates on computer programming for sustainable employment. The result of the hypothesis showed the three groups with F-value of 1.995 and a Sig. value of 0.176 which was greater than the 0.05 level of significance. Since the Sig. value > 0.05 level of significance, the null hypothesis was not rejected. Hence, the inference drawn was that the mean ratings of the opinions of computing lecturers, IT programming instructors and programmers on the business competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis of Enugu state are significantly the same.

The finding revealed that 19 soft competency items were required by computer graduates on computer programming for sustainable employment. The result of the hypothesis showed the three groups with F-value of

0.079 and a Sig. value of 0.782 which was greater than the 0.05 level of significance. Since the Sig. value > 0.05 level of significance, the null hypothesis was upheld. Hence, the conclusion that significant difference does not exist in mean ratings of the responses of computing lecturers, IT programming instructors and programmers on the soft competencies required by computer graduates on computer programming for sustainable employment in Enugu Metropolis of Enugu state. This finding is in consonance with the views of Erstad (2014), Schawbel (2014), Han (2014) and Shacklett (2013) who found ability to create or initiate ideas, effective delegation, ability to provide mentoring and support to clients, ability to meet critical deadlines, pay attention to detail, possess good memory, contract negotiation, ability to think abstractly, and on several levels; and a whole host of other attributes as the soft competencies that are crucial for career success in computer programming.

5. Conclusion

It was concluded from the study that computer graduates require a combined competency set of hard, business and soft competencies. These competencies will empower the graduate to embark on software development, gain and sustain employment in computer programming. Furthermore, acquisition of these competencies by computer graduates will help eliminate programmers' drought in Enugu Metropolis of Enugu state, Nigeria.

6. Recommendations

Based on the findings of this study, the following recommendations were made:

- 1) Teaching of the various fundamental concepts bordering on hard, business and soft competencies required by computer graduates on computer programming should be intensively taught to ensure sufficient exposure of the computer graduates.
- 2) Relevant equipments and other teaching materials should be adequately provided for computer programming courses so as to enable computing lecturers and IT programming instructors utilize them for effective teaching.
- 3) Computer graduates should be adequately sensitized to develop in them the consciousness of acquiring the necessary programming job-related competencies before and after graduation, to enable them secure and sustain good employment in programming firms.
- 4) The competencies identified in the study should be incorporated into the computer training programmes in all tertiary institutions so that it could be used for teaching, training and retraining of programmers.
- 5) Identified competencies should be made available to all computer students by the government through the media to enable them acquire the identified competencies required for a sustainable employment in IT industry.
- 6) The identified competencies should be incorporated into computer science, computer technology and computer education curriculum for tertiary institutions in Nigeria so that computer students would acquire the competencies before graduation.
- 7) Computer education graduates should keep up-to-date with the pace at which technology changes; as every IT employer look for employees with the requisite programming competency set.

References

- Bailey, J., & Mitchell, R. (2007). Industry Perceptions of the Competencies Needed by Computer Programmers: Technical, Business, and Soft Skills. *Journal of Computer Information Systems*.
- Doyle, A. (2015). *Hard Skills vs. Soft Skills*. Retrieved December 23, 2015, from <http://jobsearch.about.com/od/skills/qt/hard-soft-skills.htm>
- Erstad, W. (2014). *5 Soft Skills Every Programmer Needs (And You Might Already Have!)*. Retrieved October 17, 2015, from <http://www.rasmussen.edu/degrees/technology/blog/5-soft-skills-programmers-ne>
- Han, L. (2014). *Soft Skills Definition: What are Soft Skills?* Retrieved December 6, 2015, from <https://bemycarecoach.com/soft-skills/what-are-soft-skills>
- Javin, P. (2014). *10 Tips to Improve Programming Skill and become better Programmer, Developer*. Retrieved September 23, 2015, from <http://javarevisited.blogspot.com.ng/2014/01/10-tips-to-improve-programming-skill-become-better-programmer.html>
- McGettrick, A., Boyle, R., Ibbett, R., Lloyd, J., Lovegrove, G., & Mander, K. (2004). *Grand Challenges in Computing-Education*. UK: The British Computer Society.
- Oommen, J. (2014). *Why is programming so important in the modern world?* Retrieved October 16, 2015, from <https://www.quora.com/Why-is-programming-so-important-in-the-modern-world>

- Osuala, E. C. (2011). *Business and Computer Education*. Enugu: Cheston Agency Ltd.
- Schawbel, D. (2014). *The Multi-Generational Job Search Study 2014*. Retrieved September 16, 2015, from <http://millennialbranding.com/2014/multi-generational-job-search-study-2014/>
- Shacklett, M. (2013). *10 highly valued soft skills for IT pros*. Retrieved September 16, 2016, from <http://www.techrepublic.com/blog/10-things/10-highly-valued-soft-skills-for-it-pros/>
- Sharma, B. (2008). *What kind of skills does a Java developer need (Jobs Discussion forum at JavaRanch) html*. Retrieved March 15, 2016, from <http://www.coderanch.com/t/33318/Jobs/careers/kind-skills-Java-developer>
- Strom, D. (2014). *The 10 Most Important Programming Skills Your Business Needs to Employ*. Retrieved December 23, 2015, from <https://www.workintelligent.ly/technology/trends/2014-4-17-programming-skills-business-needs/>
- Sturgess, G. (2012). *Skills vs Competencies. What's the Difference?* Retrieved December 23, 2015, from <http://www.talentalign.com/skills-vs-competencies-whats-the-difference/>
- Tucker, D. (2014). *10 Skills Developers Should Invest In for 2014*. Retrieved September 12, 2015, from <https://medium.com/universal-mind/10-skills-developers-should-invest-in-for-2014-64eb28781489>
- Weisfeld, M. (2013). *What Skills Employers Want in a Software Developer: My Conversations with Companies Who Hire Programmers*. Retrieved December 23, 2015, from <http://www.informit.com/articles/article.aspx?p=2156240>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).