Analyzing the high school student's path to a career in cyber security

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Abstract

Students' decisions to pursue a career in cyber are influenced by many factors, such as perceived difficulty, amount of math, and many others. Additionally, certain demographic groups are more reluctant to pursue cyber security as their career field. This study surveyed high school students in an attempt to uncover sources of career information and offer strategies for educators. A three-part survey instrument was used in this study to examine students' perception of cyber security careers and exposure to cyber security career information, as well as capturing demographics. Our results suggest that universities must be more systematic and deliberate in reaching out to high school students about potential careers in cyber security fields.

Keywords: cyber security, information technology, undergraduate students, media usage

Introduction

With the constant increase in the number of cybercrimes comes the increase in the demand for cyber security professionals. According to Rende (2023), there are over 700,000 vacant cyber security positions in various fields that need to be filled if we are expected to properly secure our digital assets. One issue, however, is that many young people entering the workforce do not consider the field of cyber security as a viable option, despite this overwhelming number of open positions. There are various reasons for this, such as the perception that the cyber field is highly technical, making it not only a challenging area to study but also increasing the possibility that one will be viewed as a "nerd". Another reason is the perception that the cyber field is male dominated, which means that women will have a much more difficult time advancing in their career (Hoteit, 2022).

The significance of exposure to career options in high school cannot be overstated. Impressions of potential career fields are decided based on not only information, but experiences. Without this exposure it is possible that certain career fields will be overlooked. According to Rosenzweig and Chen (2023), among the four categories of appealing, unappealing, polarizing, and overlooked, the overlooked category is the most common.

Unappealing perceptions of careers and overlooked career prospects often stem from this lack of exposure. Most high school students are familiar with the word cybersecurity due to its popularity; however, exposure

to specific information about the field itself, professional activities, discussions with professionals, or possible careers within is less than adequate. The focus of this paper is to understand how high school students learn about possible careers and suggest strategies for recruitment to be used by college educators. The study includes the following research questions:

RQ1: *What resources/media do high school students prefer when searching for information about future careers and majors?*

RQ2: *What strategies should college educators follow when reaching out to recruit high school students for Cyber Security?*

The rest of the paper is organized as follows: the subsequent section presents a critical review of the literature as well as a description of the data collection methodology. The results section presents the analysis of survey data followed by a discussion of the results. Implications are drawn and conclusions are provided.

Literature Review

Guiding the students through the career choice process and helping them find their perfect career path is an extremely important step, which is well presented in academic literature. There is countless research studies dedicated to determining what impacts the students' decision to choose a certain career. Although for many of the students, the financial side is the main motivator in their career choice, other factors such as social prestige and personal development opportunities are also substantial reasons for their choices (Imashev et al., 2025).

CS and STEM

While some researchers focus on general recommendations, others look at specific fields and specific populations of students. The students' decision to pursue a career in Computer Science (CS), Information Technology, and similar areas are influenced by many factors (Shulga et al., 2023). CS and other STEM-related career paths often present especially difficult choices for the students, being perceived as technical and math-intense fields. Eidlin-Levy et al. (2023) showed that "math anxiety" is one of the key factors that scare students away from math-intense careers. Researchers report multiple factors that help develop a more positive view of such careers. Armoni and Galezer (2023) found that the students from high schools with dedicated CS curricula show higher acceptance and motivation toward CS careers. Other facilitating factors include the impact of CS teachers (Craig et al., 2019; Brassai & Kiss, 2020) and events such as career days (Kutlu & Bedel, 2021).

Research studies report various levels of including the sub-fields of CS and IT in the schools' curricula. For example, robotics is well-presented in many schools starting from elementary grades. Tinmaz & Fanea-Ivanovici (2023) noted that robotics is perceived as adding efficiency to the classroom and life in general. Many schools implement it in visualization of complex concepts such as programming, algorithmic thinking, and similar (Athanasiou et al., 2017). In addition, Evripidou et al. (2020) demonstrated that it helps the students develop problem-solving and presentation skills. At the same time, researchers note that some other fields are not represented in the school curriculum yet, some of them (such as Artificial Intelligence) being in their infancy. Despite that, as reported by Casal-Otero et al. (2023) the schools in the United States and China include these fields in their school curriculum more frequently than the other countries.

Cyber Security

Perception of cyber security by school students is unique compared to other IT fields. For example, Crandall et al., 2019 found that cost and time are perceived as barriers to entering this field. A more important and more general problem is simply the lack of awareness that the cyber security program exists. Ondrušková & Pospíšil (2023) found that this problem starts in elementary school and persists as the students get minimal or no cyber security training with little or no effect. The problem stems from the fact that in many cases, K-12 educators are not familiar with the field and are not confident they will be able to deliver quality lessons (Childers et al., 2023). In multiple studies, researchers emphasize that students often choose their careers in middle school. They recommend targeting programs such as cyber security to specific demographic groups (Rowland et al., 2018; Shan & Yang, 2021).

Demographics Issues

As multiple researchers point out, certain demographic groups are more reluctant to pursue cyber security as their career field. We already mentioned the example where students from the lower income families may perceive it as an "expensive" field. Another important consideration discussed in the literature is the gender-based perspective. According to Rosenzweig & Chen (2023), the overwhelming majority of female students do not prefer IT or similar careers because they doubt that they will fit in. This view is cultivated by multiple resources, such as social media, friends, and in some cases, families. Cheung (2024) found that parents who frequently and actively interfere in their children's career selection process negatively impact their ability to choose a career. Imashev et al. (2025) reported that 57.2% of the high school students in their research sample admitted that their parents had an impact on their career choices. Several researchers, in an attempt to find ways to successfully attract female students to careers in IT, mentioned gamification as a possible solution; however, the conclusions are uneven. Jin et al. (2018) utilized gamification at a cyber camp and found that male students realized a more positive impact of the field than female students. At the same time, Turner et al. (2014) found the opposite effect in a similar camp: male students tended to devalue cyber tasks that seemed too difficult to them.

Recommendations

Based on the reviewed research, we outlined the most essential recommendations that stemmed from the studies. To raise awareness about cyber security and other IT fields, the relevant curriculum needs to be introduced in schools (Armoni and Galezer, 2023). Additional steps need to be taken to attract female students to the field. Educators' support is essential, but to achieve this, quality professional training needs to be provided to those educators (Chen et al., 2021). Finally, gamification and other teaching strategies may be useful in explaining technical concepts to the students. For example, Videnovik et al. (2023) demonstrated that using a gamified environment is a way to facilitate understanding the subject matter.

Methodology

A three-part survey instrument (Appendix A) was used in this study: (1) resources used for learning about cyber security careers, (2) recruitment strategies for educators, and (3) demographics. Each of the first two sets were specifically mapped to RQ1 and RQ2, including both a quantitative/Likert-scale portion and a qualitative/open-ended portion. A third-party data collection agency (Cloud Research) was enlisted to recruit participants and administer the survey via Survey Monkey, ensuring they qualified (i.e., were juniors/seniors and were aware of the field of cyber security) and guaranteeing the pool would have an equal number of males/females.

The first set of questions addressed the most commonly used items for learning about careers, such as YouTube, Instagram, Google searches, etc., as well as determining influential people, preferences, and information credibility. The second set of questions addressed the effectiveness of college/university

recruitment strategies and scholarship offerings. There was also one open-ended question in the second set which asked students to provide suggestions on the best way to be contacted by colleges/universities. The demographic set covered items, such as the student's age and gender, and then asked for demographics specific to this research, such as grade (to limit to only juniors/seniors), plans after high school, type of secondary school, GPA, and exposure to social media.

The participant pool included only junior and senior high school students. Equal demographic distribution was not required for any category except gender, which was done to ensure statistical calculations could be completed between the two groups. Data was collected from 230 qualifying respondents and then analyzed using a combination of descriptive statistics, correlation tests, and ANOVAs. The resulting analysis is presented in the forthcoming section.

Results and Discussions

230 students completed the survey. The age breakdown is shown in Table 1. The gender breakdown was approximately even with 48.8% male, 48.3% female and 2.9% non-binary. The grade breakdown is shown in Table 2. The majority (63.2%) reported their future plans as attending college. Table 3 shows all of the students' reported future plans.

Table 1. Breakdown by age

Age	Count N=209	Percent
15	1	-
16	59	28.2
17	75	35.8
18	73	34.9
19	1	-

Table 2. Breakdown by grade

Grade	Count N=193	Percent
Freshman	1	-
Sophomore	7	3
Junior	88	45.5
Senior	95	49.2
GED/Technical School	2	1

Table 3. Breakdown of Future Plans

Grade	Count N=208	Percent
College	136	65.3
Trade School	22	10.5
Military	11	5.2
Work	20	9.6
Other	2	1
Not sure	17	8.1

Most of the students, 70.4% reported attending a public school with 9.6% in Private school, 6.1% being homeschooled and 3.9% in a charter school. The survey participants reported GPA is shown in Table 4, but almost 80% reported having a GPA over 3.0

Table 4. Breakdown by GPA

GPA	Count N=209	Percent
3.5 or more	101	48.3
3.0 to less than 3.5	66	31.6
25 to less than 3.0	25	12
2.0 to less than 2.5	9	4.3
Under 2.0	8	3.8

Not surprisingly, 60% of the students reported using Social media 3 or more hours a day with more than 28% reporting over 5 hours a day. Complete data is shown in Table 5.

Table 5. Social Media Usage

Hours per Day	Count N=209	Percent
Less than 1 hour a day	8	3.5
1 to less than 3 hours a day	63	27.4
3 to less than 5 hours a day	73	31.7
5 or more hours a day	65	28.3

RQ1 What resources/media do high school students prefer when searching for information about future careers and majors?

One of the survey questions asked the student to "Rate how much you use these items for career information."   Table 6 shows abbreviated results for that question, displaying only the top two of the 5 Likert type scale answers. The students reported using "Google Searchers" "all the time" or "Often" almost 80% of the time when searching for career information with YouTube videos closely following with almost 65%. Somewhat surprisingly, College websites were only reported to be using 15.2% "All the time" in searches for such information.

Table 6. Source of Career Information

	"All the time"	"Often"	Cumulative
Google Searches	47.9 %	31.3 %	79.1 %
YouTube	37 %	27.5 %	64.5 %
TikTok	32.7 %	19.9 %	52.6 %
Instagram	31.3 %	19.4 %	50.7 %
Snapchat	20.4 %	16.6 %	37 %
College Websites	15.2 %	18 %	33.2 %
Facebook	9 %	9.5 %	18.5 %
Twitter/X	7.5 %	10 %	17.5 %
LinkedIn	5.2 %	5.7 %	10.9 %
Vimeo	5.2 %	1.9 %	7.1 %

When asked to rate how influential people are in making their career choices, shown in Table 7, 72% of the students responded reported that their parents were "Very Influential" or "Influential". This was by far the highest ranking of any group. Parents, Family and Friends were rated the highest as influencers, with High school professionals closer to online personalities being at the bottom.

Table 7. Career Choice Influence

	"Very Influential"	"Influential"	Cumulative
Parents	42.7 %	29.4 %	72 %
Friends	30.8 %	24.2 %	55 %
Family (not Parents)	25.1 %	24.2 %	49.3 %
High School Teachers	15.6 %	32.2 %	47.9 %
High School Guidance Counselors	16.6 %	19.9 %	36.5 %
Online Personalities	15.2 %	19.9 %	35.1 %

While we think of technology being the key influencer when it comes to young people making career choices, it is clear that family, especially parents, play an enormous part in that decision. Still, the students reported preferring to learn about their future career options through video. They by far preferred video (69.7%) over other mediums. Table 8 shows the results.

Table 8. Preferred Medium

	Percent
Video	69.7
Audio	11.4
Print	11.8
Other	7.1

A series of ANOVA's were executed looking at the group means by Gender, Age, Grade and Future plans for the questions listed in Tables 6. The first ANOVA's used gender as the grouping variable and compared the means of the Likert Type scales for the "Sources of Information" variables as shown in Table 9. Two Sources of Information, YouTube (.033) and Twitter/X (.028) found significant differences between the Gender groups with a Mean value for Males of 1.95 and for Females 2.1 on the 5-point Likert Type scale.

Table 9. ANOVA results for Gender

	Significance
Google Searches	.764
YouTube	.033*
TikTok	.198
Instagram	.481
Snapchat	.179
College Websites	.418
Facebook	.314
Twitter/X	.028*
LinkedIn	.601
Vimeo	.123

One Sources of Information, Google Searches (.034), found significant differences between the Age groups (15-19). A Tukey analysis was performed and found no significant differences in the pairwise comparisons.

Table 10. ANOVA results for Age

	Significance
Google Searches	.034*
YouTube	.368
TikTok	.977
Instagram	.203
Snapchat	.407
College Websites	.963
Facebook	.822
Twitter/X	.132
LinkedIn	.417
Vimeo	.368

Two Sources of Information, Google Searches (.038) and TikTok (.029) found significant differences between the Grade groups (Junior, Senior, Other). A Tukey analysis was performed and found significant differences between the Other group and both the Junior (sig. = .036) and Senior (sig. = .029) groups.

Table 11. ANOVA results for Grade

	Significance
Google Searches	.038*
YouTube	.054
TikTok	.029*
Instagram	.949
Snapchat	.217
College Websites	.059
Facebook	.371
Twitter/X	.172
LinkedIn	.090
Vimeo	.357

One Sources of Information, Vimeo (.002), found significant differences between the Future Plans groups. The Future Plans consisted of College, Trade School, Military, Work, Other and Not Sure. More details can be found in Table 3. A Tukey analysis was performed and found no significant differences in the pairwise comparisons.

Table 12. ANOVA results for Future Plans

	Significance
Google Searches	.066
YouTube	.783
TikTok	.795
Instagram	.078
Snapchat	.566
College Websites	.459
Facebook	.277
Twitter/X	.233
LinkedIn	.219
Vimeo	.002*

RQ2 What strategies should college educators follow when reaching out to recruit high school students for Cyber Security?

It is clear that the students reported video as their most preferred method of obtaining information, and Google Searches, YouTube and TikTok are their top three methods of obtaining career information. Yet, looking at table 13, it is clear they are wary of the information they are obtaining from these sources. With "Moderately Credible" being the most selected option and only 16.6% receiving a rating of "Very Credible."

Table 13. Perception of Credibility of Online Sources of Career Information

	Percent
Very Credible	16.6
Credible	35.1
Moderately Credible	43.6
Barely Credible	4.3
Not Credible at all	.5

The students prefer to gather their information via videos yet only rate such information as "Moderately Credible", we next asked the students how effective they thought colleges and universities were at marketing their programs. Not surprisingly, the results mirror the students' perception of online information credibility.

Table 14. Perception of Effectiveness of College Advertising to High School Students

	Percent
Very Effective	17.2
Effective	32.1
Moderately Effective	39.7
Barely Effective	9.6
Not Effective at all	1.4

One area that colleges and universities use to market programs is with the use of scholarships. Students reported that scholarships are "Very Important" (37.3%) and "Important (30.6%) when selecting a college major. This appears to fit well with the importance that the students placed on their parents in selecting a career choice as well.

Table 15. Perception of Effectiveness of the Importance of Scholarships

	Percent
Very Important	37.3
Important	30.6
Moderately Important	27.3
Barely Important	4.3
Not Important at all	0.5

The last survey question in answering RQ2 was, "Do you have any suggestions on how schools should contact students concerning a career in cyber security?". This open-ended question generated a variety of responses. A thematic analysis of all the answers provided was performed and a systematic reduction of the qualitative data (per Stake (1995), Creswell (2003), and Yin (2009)) showed four different themes that emerged. These are:

1) Awareness about Cyber careers: Our participants feel there is a lack of understanding about cyber security careers and their associated benefits. An effective strategy for colleges to use would be to work on raising awareness of cyber careers among high school kids and school districts. Some common steps could be presenting talks in high school about cyber careers, highlighting the need for cyber professionals and the rewarding nature of such careers. Students should be aware of opportunities that are out there in the market. They should also be mindful of their responsibility to secure their digital profile and critical information. One participant said:

> *"Teach Passwords and Privacy- Help protect your children's passwords on all devices and online accounts. Teach them why creating strong passwords is essential, how to create them and never to share them."*

2) Advertisement of programs: Participants suggest that colleges advertise their programs appropriately. They should also send out surveys to high school students gauging their interest in the cyber field. Providing a course or two in cyber security at the high school level will better inform students what the career entails. A high school student should be able to understand what cyber program offers before they make an informed decision. A big part of this strategy would involve having a strong social media presence.

3) Provide resources: Our data suggests that students need more resources to become aware of the demands of a cyber career. Colleges should provide opportunities to engage high school students in conferences or workshops on relevant topics. Webinars are a valuable way of reaching out to potential students. Cyber clubs in universities would be a helpful liaison between colleges and high schools in developing a favorable perception of cyber careers.

4) Exposure: Our data suggests early exposure to cyber security skills, competencies, and opportunities could shape high school students' perceptions of cyber careers. A good start would be offering high school-level courses and sharing opportunities to participate in cyber competitions. Any internship or possibility of working on a team for a project will also boost students' confidence. One of our participants commented:

> *"Partnering with local businesses or organizations to offer cybersecurity internships can give students real-world experience and mentorship."*

A series of ANOVAs were executed looking at the group means by Gender, Age, Grade and Future plans for the items listed in Table 7. The first ANOVA's used gender as the grouping variable and compared the means of the Likert Type scales for the "Career Choice Influence" variables as shown in Table 16. There were no significant differences between the means.

Table 16. ANOVA results for Gender

	Significance
High School Teachers	.235
High School Guidance Counselor	.939
College Admissions Counselor	.617
Parents	.764
Friends	.227
Family	.667
Online Personalities	.282

The next ANOVAs used Age (16-19) as the grouping variable and compared the means of the Likert Type scales for the "Career Choice Influence" variables as shown in Table 17. There were no significant differences between the means.

Table 17. ANOVA results for Age

	Significance
High School Teachers	.140
High School Guidance Counselor	.902
College Admissions Counselor	.967
Parents	.499
Friends	.593
Family	.435
Online Personalities	.863

The next ANOVAs used Grade as the grouping variable and compared the means of the Likert Type scales for the "Career Choice Influence" variables as shown in Table 18. There were no significant differences between the means.

Table 18. ANOVA results for Grade

	Significance
High School Teachers	.117
High School Guidance Counselor	.853
College Admissions Counselor	.067
Parents	.127
Friends	.601
Family	.068
Online Personalities	.265

The next ANOVAs used Future Plans as the grouping variable and compared the means of the Likert Type scales for the "Career Choice Influence" variables as shown in Table 19. There were no significant differences between the means.

Table 19. ANOVA results for Future Plans

	Significance
High School Teachers	.111
High School Guidance Counselor	.732
College Admissions Counselor	.341
Parents	.462
Friends	.687
Family	.678
Online Personalities	.803

Conclusion

Our results suggest that universities must be more systematic and deliberate in reaching out to high school students about potential careers in cyber security fields. The students reported that Google Searches and YouTube Videos are their preferred methods of obtaining information on careers and that University Websites are low on their list of options. The other interesting finding was just how influential parents and

family are in selecting a career. Additionally, the low ranking of high school teachers and guidance counselors were noted. The results appear to be consistent across gender, age, grade, and future plans. There are a few minor differences in the use of some Information Sources by those same variables, but the differences do not appear to be significant enough to impact resource distribution by college admissions.

There is a significant demand for cyber professionals in the workforce. High school students do not have a good understanding of what a career in cyber security entails. Universities are in a unique position to bridge this gap by raising awareness and creating a favorable perception of cyber in prospective college students so that we can work on building the pipeline of skilled cyber security workers. This study has implications for university administrators who can channel their resources to adapt to the needs of the hour for recruitment in cyber security majors. The focus on websites appears to be one aspect that can be changed. Another recommendation is to focus on the parents and family; they appear to have a much stronger influence than students let on. A possible direction for future research would be to investigate where parents get their information on what makes a good career for their children, since they appear to be the prime motivator in the students' career selection process.

References

Armoni, M. & Gal-ezer, J. (2023). High-school computer science–Its effect on the choice of higher education. *Informatics in Education*, 22(2), 183-206.

Athanasiou, L., Topali, P., & Mikropoulous, T. A. (2017). The use of robotics in introductory programming for elementary students. *Educational Robotics in the Makers Era*, pp. 1, 183-192.

Brassai, L. & Kiss, I. (2020). A pilot study of the role of experiential components of career choice intention among final year high school and vocational education students. *International Journal of Education and Psychology in the Community*, 10(1/2), 186-203.

Casal-Otero, L., Catala, A., Fernandez-Morante, C., Taboada, M., Cebreiro, B., & Barro, S. (2023). AI literacy in K-12: A systematic literature review. *International Journal of STEM Education*, 10(1), 1-17. DOI:10.1186/s40594-023-00418-7

Chen, W., He, Y., Tian, X., & He, W. (2021). Exploring cybersecurity education at the K-12 level. *SITE Interactive Online 2021 Conference.*

Childers, G., Linsky, C. L., Payne, B., Byers, J., & Baker, D. (2023). K-12 educators' self-confidence in designing and implementing cybersecurity lessons. *Computers and Education Open*, 4, 1-8. https://doi.org/10.1016/j.caeo.2022.100119

Craig, C. J., Evans, P., Verma, R., Stokes, D., & Li, J. (2019). A tribute to 'unsung teachers': Teachers' influences on students enrolling in STEM programs with the intent of entering STEM careers. *European Journal of Teacher Education*, 42(3), 335-358.

Crandall, K. S., Noteboom, C., El–Gayar, O. F., & Crandall, K. (2019). High school students' perceptions of cybersecurity: An explanatory case study. *Issues in Information Systems*, 20(3), 74-82.

Cheung, F. (2024). Career self-efficacy as a mediator between career-specific parental behaviors and school career support on career doubt. *BMC Psychology*, 12, 1-10. DOI:10.1186/s40359-024-01536-9

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches, 2nd ed*. Thousand Oaks, CA: Sage.

Eidlin-Levy, H., Avraham, E., Fares, L., & Rubinstein, O. (2023). Math anxiety affects career choices during development. *International Journal of STEM Education*, 10(1), 1-12. DOI:10.1186/s40594-023-00441-8

Evripidou, S., Georgiou, K., Doitsidis, L., Amanatiadis, A. A., Zinonos, Z., & Chatzichristofis, S. A. (2020). Educational robotics: Platforms, competitions and expected learning outcomes. *IEEE Access*, 8, 219534-219562.

Imashev, A., Salkynbayeva, F., Kizimbayeva, A., and Mukhambetova, L. (2025). Financial and social factors shaping high school students' career choices. *SHS Web of Conferences*, 212, 04053.

Jin, G., Tu, M., Kim, T., Heffron, J., & White, J. (Eds). (2018). *Proceedings of the Special Interest Group Computer Science Education* 2018. ACM.

Kutlu, A. & Bedel, A. (2021). Effect of career days on high school students' irrational beliefs about career choice and on decision making skills about career. *Participatory Educational Research*, 8(4), 454-466.

Ondrušková, D. & Pospíšil, R. (2023). The good practices for implementation of cyber security education for school children. *Contemporary Educational Technology*, 15(3), 1-16. DOI:10.30935/cedtech/13253

Rosenzweig, E. Q. & Chen, X. (2023). Which STEM careers are most appealing? Examining high school students' preferences and motivational beliefs for different STEM career choices. *International Journal of STEM Education*, 10(1), 1-25. DOI:10.1186/s40594-023-00427-6

Rowland, P., Podhradsky, A., & Plucker, S. (Eds). (2018). *Proceedings of the 51st Hawaii International Conference on System Sciences*.

Shan, M. & Yang, J. (2021). Investigating the accessibility and impacts of cybersecurity programs on high-school girls' long-term industry engagement. *Information & Computer Security*, 30(3), 309-323.

Shulga, T. I., Zaripova, Z. F., Sakhieva, R. G., Devyatkin, G. S., Chauzova, V. A., & Zhdanov, S. P. (2023). Learners' career choices in STEM education: A review of empirical studies. *EURAISA Journal of Mathematics, Science and Technology Education*, 19(5), 1-13. https://doi.org/10.29333/ejmste/13154

Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage

Tinmaz, H. & Fanea-Ivanovici, M. (2023). Perception of robotics in general and in higher education for the industry 4.0 era. *European Journal of Interdisciplinary Studies*, 15(2), 1-16.

Turner, G. E., Deemer, E. D., Tims, H. E., Corbett, K., & Mhire, J. (2014). Cyber value and interest development: Assessment of a STEM career intervention for high school students. *Electronic Journal of Science Education*, 18(1), 1-15.

Videnovik, M., Vold, T., Kiønig, L., Bogdanova, A. M., & Trajkovik, V. (2023). Game-based learning in computer science education: A scoping literature review. *International Journal of STEM Education*, 10(1), 1-23. DOI:10.1186/s40594-023-00447-2

Yin, R. K. (2009). *Case study research: Design and method, 4th ed.* Thousand Oaks, CA: Sage.

Appendix A: Survey Instrument

Qualifying Questions

Have you heard of Cybersecurity as a career field?
- Yes
- No

Are you currently a high school student?
- Yes
- No

Resources & Media Used in Career Search

1. Rate how much you use these items for career information:

	All the time	Often	Sometimes	Rarely	Never
YouTube					
Vimeo					
TikTok					
Twitter/X					
Instagram					
Snapchat					
LinkedIn					
Facebook					
College websites					
Google searches					
Other (please specify)					

2. How influential are the following people in making your career choices?

	Very Influential	Influential	Somewhat Influential	Barely Influential	Not At All Influential
High school teachers					
High school guidance counselors					
College admissions counselors					
Parents					
Friends					
Family (other than parents)					
Online personalities (TikTok, YouTube, etc.)					
Other (please specify)					

3. If you rated Online personalities or Other three or above, please list the specific people/personalities.

4. How do you prefer to learn about future careers?
- Video
- Audio
- Print
- Other (please specify)

5. What is your preferred medium of getting credible career information? (family, social media, college websites, counselors, google search, career blogs, others)?

6. How do you perceive the credibility of online resources regarding information about future careers and majors?
- Very credible
- Credible
- Moderately credible
- Barely credible
- Not credible at all

College Educators – Recruitment Strategies

1. How effective are colleges and Universities in reaching out to High School students?
- Very effective
- Effective
- Moderately effective
- Barely effective
- Not effective at all

2. How important are scholarship opportunities in selecting a major, not a school?
- Very important
- Important
- Moderately important
- Barely important
- Not important at all

3. Do you have any suggestions on how schools should contact students concerning a career in cybersecurity?

Demographic Questions

1. What is your age?
- 16
- 17
- 18
- Other (please specify)

2. What is your gender?

- Male
- Female
- Non-binary
- Prefer not to answer

3. What grade are you in?
- Junior
- Senior
- Other (please specify)

4. What are your future plans after completing high school
- College
- Military
- Trade school
- Work
- Not sure
- Other (please specify)

5. What is your GPA?
- 3.5 or more
- 3.0 to less than 3.5
- 2.5 to less than 3.0
- 2.0 to less than 2.5
- Under 2.0

6. How frequently do you use social media on a daily basis?
- Less than 1 hour a day
- 1 to less than 3 hours a day
- 3 to less than 5 hours a day
- 5 or more hours a day

7. What best describes your school?
- Public
- Private
- Charter
- Homeschooling
- Other (please specify)