



## **Critical Thinking: A Survival Skill for Electronics Work Craftsmen in the Rapidly Evolving Electronics Industry**

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### **Abstract**

This manuscript explores the importance of critical thinking skills for electronics work craftsmen. Electronics work craftsmen are responsible for troubleshooting, repairing, and maintaining electronic devices. However, with the evolving nature of electronic products due to technological advancements, craftsmen face increasing complexity in their field. This paper therefore argues that application of critical thinking skills is crucial for navigating these complexities and remaining effective in the profession. It begins by discussing the changing landscape of electronic devices, citing examples such as the evolution of cell phones. These constant changes in design and functionality pose challenges for craftsmen, as they need to adapt their approaches to repair and maintenance. Conventional approaches may no longer be sufficient in addressing the problems that arise due to technological advancements. The manuscript emphasizes that acquiring critical thinking skills, along with technical knowledge, are essential for problem-solving in the field. Suggestions include pursuing formal education and training programs that are centered on critical thinking, and engaging in lifelong learning. Conclusively, the manuscript emphasizes that nurturing critical thinking skills is crucial for electronics work craftsmen to excel in their profession. By developing these skills, craftsmen can effectively tackle complex problems, remain relevant, and thrive in an ever-evolving world of technology.

**Keywords:** *Critical thinking skills, Electronics work craftsmen, Ever-evolving technology, Lifelong learning*

### **1. Introduction**

Electronics work craftsmen are individuals who have been trained in the art and manipulative skills involved in electronic technology. They are graduates of electronics work programme in technical colleges. In Nigeria, electronics work programme in technical colleges aims at producing craftsmen who are expected to, among others, acquire knowledge and skills to enable them understand the principles and operation of electronic devices, troubleshooting or faults tracing, as well as repairing of electronics appliances (National Board for Technical Education (NBTE), 2004). Therefore, an electronics work craftsman is expected to be able to design, build, test, diagnose, troubleshoot, service, maintain and completely repair any fault in electronic devices. On completing the electronic work programme, craftsmen have the option of securing employment in industries, or to become self-employed by setting up their own businesses. They make a living by skillfully

solving problems or correcting faults in electronic appliances such as televisions, radios, amplifiers, mobile phones, computers, and the likes. They earn income through payment from clients or an employer, for the service rendered. In this way, they reduce the Nigeria unemployed statistic, becomes an asset in their family, and also contribute to national development.

For increased profitability and assurance of prosperity in their profession, good customer satisfaction is essential for electronic craftsmen because satisfied customers are likely to return for more patronage in future, and probably also make referrals. Therefore, to remain relevant, it is of necessity for craftsmen to add value to the services they render, which is mainly possible through skill development in this rapidly changing society.

### **2. The New World for Electronics Work Craftsmen**

The world changes rapidly on a daily basis, affecting every person, every industry, every profession, every workers, including those who work in the electronics industry due to technological advancements. Currently, we live in a society where standards and

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conditions are constantly changing. This includes standards for school enrollment, graduation as well as employment and promotion at various professions. A world in which job specifications, expertise, including qualifications required to progress on the job can't be predicted. It is hard to foresee the products that will be available tomorrow, and electronics technicians do not even know what kind of electronic equipment consumers will bring in the next day for repair. All these are because electronic devices are evolving rapidly in their components, design and functionality. These are realities that are becoming increasingly complex, and many represent significant dangers and threats for electronic craftsmen profitability and livelihood.

Considering the revolution that is occurring in the production of televisions (TV), Cathode ray tube (CRT) TVs were the pinnacle of technology from the 1930s through the 2000s. Then, in the early 2000s, flat-screen TV sets began to debut, with two flat-panel technologies which are LCD and Plasma. Plasma televisions were later surpassed in popularity by LCD and LED technology as the cost of LCD sets decreased. According to BT Group (2016), in the mid 2010's LED TVs became popular, then followed by Smart TVs which have built-in internet connectivity. Year 2016 marked the introduction of staggeringly thin and physically flexible TV sets known as OLED (Organic Light Emitting Diode) TV sets. This is a variation on LED TVs, but without a backlight.

In the same vein, cell phones have also evolved immensely both in design and function from the first mobile phone, Motorola DynaTac, which was released in 1973 to diverse kinds and manners of smartphones. Most consumers pride themselves in using state-of-the-art electronic devices, probably because they provide positive opportunities for users to be more efficient with time and be more productive (Kaur & Verma, 2023). According to Ofcom (2021), at the start of 2015, 21% of homes had a smart TV set, rising from 12% on 2014. Incessant changes in design of electronic products, as a result of technological advancements have significant implication for electronics work craftsmen. This is because repair and maintenance of these evolving electronic devices will now require a combination of approaches that are different from what they have been using.

**3. Navigating Complexities: The Imperative of Critical Thinking for Electronics Work Craftsmen**  
Complexities in design of electronic products increases the complexity of faults or problems that electronic work craftsmen will have to tackle. In the rapidly changing landscape of electronics, the traditional approaches and techniques that craftsmen have relied upon for years may no longer suffice. A new world now confronts electronics work craftsmen, demanding the application of critical thinking skills.

The ability to think critically, reason logically, and analyze complex problems becomes essential in navigating the intricate challenges of this evolving field. Craftsmen must continually relearn and regularly reevaluate the way they work to stay relevant and effective. According to Tran (2016), problem solving is essentially the profession of craftsmen, and as the complexities of problems increase, there is an increasing need for them to apply critical thinking to solve more problems. Also, in order to tackle problems that are occasioned by advancements in electronic technology, electronics craftsmen and technicians will require critical thinking with their technical knowledge. The National Academy of Engineering (NAE) have also outlined the following important attributes: strong critical thinking skills, creativity, ingenuity, professionalism, and leadership as attributes that are needed by students in engineering-related fields to face future challenges in professional practice (Bumbaco & Douglas, 2014). For electronics craftsmen to tackle challenging situations in their course of practice, (Adair & Jaeger, 2016) in their research also stressed the importance of cultivating critical thinking skills during technical development. According to them, students in engineering-related fields now need strong critical thinking skills to deal with a world of increasingly rapid change and complexity. In the same vein, Richard and Dillon (1995) stated that acquisition of critical thinking skills by students in engineering-related fields will lead to high academic and professional achievement. Against the background of rapidly changing technological environments, electronics work students who are prospective electronic work craftsmen are expected to become critical thinkers.

#### **4. Acquiring Critical Thinking Skills**

The most fundamental nature of critical thinking is simple and intuitive, since it is the nature of all humans to think. The problem is that much of human thinking, left to itself, is biased, distorted, partial, or uninformed (Scriven & Paul, 1987). Critical thinking begins when individuals start being mindful about his/her thinking with a view towards improving it. Papadopoulos et al. (2006) defined critical thinking as a systematic approach to problem solving, including complete and well-conceived problem formulation, generation of a solution, and careful assessment of the solution. Furthermore, Elder (2007) defined critical thinking as self-guided, self-disciplined thinking which attempts to reason at the highest level of quality in a fair-minded way. Halpern and Dunn (2022) also described critical thinking as thinking that is purposeful, reasoned, and goal directed. While the importance of critical thinking skills is clear, it is unclear how electronics work craftsmen can acquire and develop these skills. It is therefore crucial for teachers and experts in the field to seek more solutions and provide guidance to craftsmen in nurturing their critical thinking abilities. According

to Nelson (1999), here are a few strategies that can aid in the acquisition of critical thinking skills:

1. **Formal Education and Training:** craftsmen are encouraged to pursue formal education and training programs that specifically focus on critical thinking. Courses that emphasize problem-solving, logical reasoning, and analysis can help craftsmen enhance their cognitive abilities. Examples of such courses include Data Analysis for Decision Making and Project Management for Craftsmen.
2. **Continuous Learning:** Electronics work craftsmen must embrace a mindset of lifelong learning. It's essential to keep up with the newest technical developments, market trends, and best practices. Engaging in continuous learning through workshops, seminars, online courses, and industry conferences can foster critical thinking skills and provide exposure to new ideas and perspectives.
3. **Collaborative Problem Solving:** Opportunities for craftsmen to collaborate on projects and solve problems together can significantly enhance critical thinking abilities. By working in diverse teams, craftsmen can learn from one another, gain different perspectives, and collectively arrive at innovative solutions.
4. **Reflective Practice:** craftsmen are encouraged to engage in reflective practice for self-improvement and critical thinking development. Regularly evaluating past projects, analyzing successes and failures, and identifying areas for improvement fosters a growth mindset and helps craftsmen refine their problem-solving skills.
5. **Teaching Methods:** Developing critical thinking in electronics craftsmen also requires teaching methods that encourage active engagement, problem-solving, and practical application of theoretical concepts. Example of such teaching methods are Reverse Engineering, Project-Based Learning, and Case Study Analysis.

## 5. Conclusion

Nurturing critical thinking skills is paramount for electronics work craftsmen to excel in an ever-evolving world. The rapid pace of technological change demands that craftsmen continuously adapt, learn, and refine their approaches. By acquiring critical thinking skills, craftsmen can effectively tackle complex problems, remain relevant, and thrive in their professional practice. The acquisition of critical thinking skills is not only instrumental in enhancing the quality of work but also has a profound impact on the overall quality of life of electronics work craftsmen. As craftsmen become adept at critical thinking, they will be better equipped to tackle complex challenges and find creative solutions. This competence can lead to increased job

satisfaction, professional growth, and opportunities for advancement. Moreover, critical thinking skills extend beyond the professional realm, positive decision-making, problem-solving, and the ability to adapt to various life situations.

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