

Study Guide for Tinkerers, by David Brin:

**Imagine a nation that lost its ability and desire to make things. Might there be a way out?
A way back to the American tradition of progress and industry?**

This study guide is meant to help individuals, students and classes to appraise, understand and discuss the graphic novel **Tinkerers**, by David Brin. Set in the near future of 2024, it portrays a small American town whose nearby river bridge – its lifeline to the world – collapses one day, for lack of maintenance and care. Our point of view character, Danny Nakamura, becomes a hero, using his tinkering skills to save a busload of kids. He then decides to go on a quest, visiting some of the smartest people in town to ask them why and how this disaster could have happened? Did the bridge's decay and collapse illustrate a decline in citizens' ability to maintain their civilization?

Some of the important town figures he interviews are among the foreigners who have been buying up land and businesses in town. Is America destined to become a poor, agricultural satrapy of other nations where dynamic ways still prevail? Or might their cynical diagnoses of American decline be premature? In his quest, Danny takes a tour of industrial history, especially in the U.S. and compares conflicting versions.

He is also engaged in a mysterious project that -- as we gradually learn -- involves many of his fellow townsfolk, bringing together their hopes and skills to do something original and new.

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Tinkerers presents a 'dystopic' future. What does this mean? Can you think of other dystopic novels or movies? Why the fascination with dark futures? What do these scenarios tell us about our present? Do they serve to motivate us...or simply fill us with despair?

Tinkering refers to making things through experiment, trial-and-error, and even just for fun. Do you have hobbies that involve creating or making things? Do you have relatives or friends with jobs or hobbies that involve tinkering or manufacturing or building?

Can you name twenty jobs that are essential to building or maintaining our society, our cities, our bridges, our schools and roads? What would happen if these jobs were not filled?

Are those the only workers who get things done? What about those who teach the *skills* needed to do these things? Or the support networks that let skilled people get on with their jobs? How wide does the network of dependence spread?

Tinkerers is concerned with the state of manufacturing in America. Name twenty manufactured items that you use daily. Are they made in America or overseas? Does it sometimes get complicated? (Sometimes a car that's assembled in the U.S. contains mostly foreign made parts... and vice versa.)

Choose one object. Can you list some of the materials that went into the construction of that object? For example a pencil is made of graphite, wood, rubber, metal and paint. How does a factory arrange to transport and assemble such materials from around the world?

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“They say history can turn for want of a nail... (p. 1).” Look up the full proverbial rhyme, “For want of a nail...the kingdom was lost” and discuss what this means. How can small, nearly inconsequential things have big, long-term consequences? Give some examples.

Page 2 shows high school students graduating, and the career choices they made. How have career choices changed over the last fifty years? What new career options do you face that weren't available to your grandparents? What new careers or jobs may be available to your children?

Which jobs provide “primary” goods and services like food and necessities?

During commencement, the principal speaks of “...the nation that took humanity to the moon, and invented the internet (p. 3)”, discussing the accomplishments and perhaps, decline of America. What do you consider America's greatest accomplishments? What type of future accomplishments can you anticipate?

In his speech, the principal says, “Some expect us to sink into a twilight of nostalgia. But I know – looking at your faces – that our best days lie ahead (p. 3).” Do you believe this? Are you optimistic or pessimistic over our future? What is the difference between pride and nostalgia for the past?

“Curiosity burned like molten metal (p. 6).” What question drives Danny? Have you ever felt an intense curiosity that drove you to learn, to investigate some topic (beyond the range of what you are assigned in school) with a passion?

The blacksmith tells Danny: “Some will tell you nations are like people. They pass through phases. Eager youth...vigorous adulthood...then smugness...decadence...decline (p. 6).” Can you point to examples from history, where empires and nations have grown and then declined? Do you feel that America is on an upward or downward path? Can a person or nation reverse its path?

Manufacturing “shifted to electrified cities, where immigrant labor...for the first time made clothing affordable for all (p. 10).” Industrialization was a major turning point, where workers left farms and towns for cities and factories. What are the good and bad side effects of industrialization? Consider the impacts on families and the environment, as well as making inexpensive goods widely available to the masses. While factory conditions were often poor, millions rushed to take those jobs in preference over farming life. What does that tell you?

Tinkerers describes teenagers “messing with cars or radios (p. 11)” – and then using these skills during the war. “Years later, something similar happened – when computer geeks turned their hobby into an industry (p. 11)” Do you have hobbies, skills that would be useful in a job?

If kids in the 20s and 30s tinkered with radios, teens in the 40s and 50s with cars, and those in the 70s and 80s with computers, what technology do teens today interact with? What new hobby technology is taking hold that may lead to a new generation of tinkerers? Have you heard of the “Maker Movement” or Make Magazine or Tech Shops?

On page 13, Tinkerers discusses the “professionalization” of our society. In 1900, an individual family was likely to grow and preserve their own food, sew their own clothes, fix their own tools...whereas now specialists do many of these tasks for us. How has this professionalization changed our society? Have we lost some of the competence possessed by our great-grandparents – even while gaining new skills for a changing world?

“The world runs on trade...but empires charged a price. They imposed trade routes, tariffs, monopolies, all favoring home industries and the capital city (p. 15).” Look up the terms, tariffs and monopolies, and discuss how they are used in today’s economy. What industries does the government subsidize and encourage? Should the government select and shelter certain industries – or let market forces take effect?

Adam Smith “saw markets as positive sum games...fair and open competition making everyone richer, even the losers. But humans seldom play fair! They conspire, cheat or bend the rules (p. 15).” What is a positive sum game versus a negative sum game? Do we have a level playing field for everyone to compete? How do people or companies bend rules to gain economic advantage?

“Sure fret over labor practices, corruption, pollution. But when the world majority is middle class, they can demand labor and eco-laws. Peasants can’t...It was Marshall’s big plan to build peace through prosperity (p. 18)” Have you ever heard the term, “a rising tide floats all boats?” Discuss what this means, as well as the concept of “peace through prosperity.” Would a world middle class demand more freedom and ecology than poor peasants?

“Adam Smith’s win-win should harness competition and cooperation for the good of all (p. 18)” How are both cooperation and competition essential to our economy?

“Infrastructure: A nation’s bone and sinew (p. 20)!” What does infrastructure refer to? How do we go about maintaining this infrastructure? What happens when we neglect this?

“Factories made the U.S. strong. But manufacturing is dirty. Unions are expensive. So we shipped all that overseas, expecting to replace ‘em with clean industry (p. 20)” What industries have we outsourced to other countries? How does this affect jobs, as well as expertise in manufacturing?

Examine the design of the bridge on the last page. How does it relate to traditional bridges you have observed? Research the forces of tension and compression and how they interact in a bridge. Investigate the term “tensegrity” as it applies to design.

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Summarize the types of answers that Danny gets from the adults he visits. What shapes the adults’ differing views of industry and the decline of manufacturing? Are some of them blinded by a habit of contempt? Which of their attitudes surprised you the most?

Did they cover all the explanations and suggestions you can think of? Was anything left out?

What historical factors led to the great era of America’s industrial pre-eminence? What factors led to its decline? What factors could lead to its recovery?

Research: desktop manufacturing, computer-aided design and manufacturing, as well as 3D printing and the Maker Movement. Discuss how these may shape the future of making things and tinkering.