

Saxon Mathematics Program: An Analysis

By James D. Nickel

Beginning in the late 1980s, “Saxon math” took the math education scene by storm. Noticing the decline of math test scores (e.g., SAT), John Saxon (1923-1996), retired Lt. Colonel, United States Air Force, sought to rectify the situation by writing a series of high school textbooks aimed at improving such scores (and prepare the student for rigorous college science courses). He and his associates eventually generated a complete math curriculum (K-12) plus a textbook on high school physics (NB. In June of 2004, Harcourt Achieve, headquartered in Austin, Texas, acquired Saxon Publishers and the implications of this buy out for the future of the Saxon mathematics program is an “open question”).

In these books, Saxon sought to teach mastery of basic skills using extensive revision (called the “incremental” approach). For example, in Lesson “x”, he would introduce a new skill set (e.g., the sum law of exponents). In the homework assignment (usually 30 questions), he would include one or two problems related to that skill set while all the other problems reviewed the skill sets taught in all the lessons before Lesson “x”. By this method, Saxon hoped to instill in the student sufficient “skill set retention” so that when it came time to take a standardized test like the SAT, the student would be able to “churn out” the correct answers (almost without thinking).

... our school curricula, by stripping mathematics of its cultural content and leaving a bare skeleton of technicalities, have repelled many a fine mind.

Tobias Dantzig, *Number: The Language of Science* (New York: Doubleday Anchor Books, [1930, 1933, 1939] 1954), p. ix.

Saxon was an engineer by trade and his textbooks carry the “engineering” flavor (or “cook book approach”) in that they are basically “how to” books; i.e., here is the technique you use to find the answer to this type of math problem. Saxon saw a dilemma (failing test scores) and, like a good engineer, he decided to fix it. He initially marketed his books in the government schools. Many “rank and file” public school teachers are devoted to the program because they have seen it “work.” According to statistics gathered and promoted by Saxon publishers, math standardized test scores did increase if a student learned math the “Saxon way.” In contrast, in some states, government educators have “banned” the use of his books. So, there is a definite “love/hate” attitude toward Saxon math in the world of the tax-sponsored government schools.

In the late 1980s, I tried to purchase some of these textbooks to augment my family’s homeschooling program. When Saxon Publishers found out that I was a homeschooler, they were reluctant to fill my order. “We only sell to public schools” was their blunt reply (implying that home schools were not “real” schools). It did not take long before Saxon Publishers realized that they could “profit” from selling materials to Christian homeschoolers. In the 1990s, Saxon math met an emerging need in the Christian day school and homeschool market, the need for an “easy to use” math program that required little, if any, teacher/parent intervention/instruction. Just what the doctor ordered!

The Saxon math program attempted to fix a short term problem and short term fixes are just that, a fix for the short term. I have not done an official survey of students who have labored through the Saxon math program. I know of some students who really like it, but I also know of many students who find the

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program deadly boring and mind-numbing. I know of many educators (high school and college), especially those with extensive training and experience in mathematics teaching, who express serious reservations about the way Saxon teaches mathematics. I also know of many homeschool parents who have found the Saxon math program to be a “savior.” Why? The answers vary somewhat, but the main reason is that *it is a pragmatic fix*. Paraphrasing the words of one homeschooling mother, “I can stick the books in front of Johnny and then forget about it. Thank God!”

In the wonderful book by Edward B. Burger and Michael Starbird entitled *The Heart of Mathematics: An Invitation to Effective Thinking* (Emeryville, California: Key College Publishing, [2000] 2005), the authors make this important point, “Understanding is rock. Memory is sand. Build on rock.”¹ In contrast, Saxon math books are replete with mechanical routine and they depend almost entirely upon rote learning and repetition *instead of helping students understand the why*. In Saxon math, “WHY?” is a big unanswered question. In fact, the way Saxon math avoids conceptual explanation (much more difficult to explain and to teach) is almost embraced as a virtue. “Here is the problem, I’m telling you how to do it, and don’t worry about the explanation because you don’t need to know that.” This methodology creates problems for later teachers (i.e., college professors), many of whom (if they are good professors) will be insisting on explaining things to students who have been trained in the “virtue” of not wanting explanations (just the skills to pass the exams and the course).

In the words of Calvin Jongsma, long-time professor of mathematics at Dordt College, “rote drill generates a sense of bored familiarity and maybe contempt, not understanding and insight” (from a talk entitled *Give Saxon the Ax!* and given on May 29, 1991). A certain amount of drill and review is necessary, but we should not carry it to the extreme (the way Saxon does). And, once a student understands the *why*, further drill is *unnecessary*. Jongsma continues, “Saxon answers critics of drill that every sport and artistic performance requires a great deal of practice, drill of skills; yet there is more to athletics and art and math than technique and reflex actions.” What students need is the challenge of training in wisdom; i.e., in how to apply what they know how to do to more complex settings.

There is a pathological problem with the Saxon approach to learning. In the absolutization of the “manipulatory skill set” or “incremental” approach to learning the student becomes conditioned, in the Pavlovian context [Ivan Petrovich Pavlov (1849-1936) was a Russian psychologist who analyzed conditional or reflex responses], to do math problems as a “reflex reaction.” Saxon math is mechanical, automated, pragmatic learning absolutized and this type of learning fits the mechanized world view of modern science; i.e., the whole of the universe, including mankind, are mere machines. You feed them the right input and at the “ringing of the bell,” you will get the expected output. The Saxon math program may sponsor good SAT scores, but is also sponsors enfeebled mathematical sensibility.² In the words of Professor Jongsma, “Saxon’s curriculum is a travesty perpetrated upon the mathematics community. How did educators allow it to happen, and how can we continue to do nothing about it?”

In light of the faulty methodology employed by the Saxon math program, I would now like to grade the program based upon the answers to several questions.

¹ p. 462, first edition.

² Note, SAT exams do not test for wisdom; by the nature of the “beast,” these exams only test for knowledge of the facts and some ability to understand or reason from those facts.

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- Does it teach the Biblical Christian world view? Does it teach that all knowledge is founded upon the fear of the Lord? There are no explicitly Biblical Christian assumptions and the entire series is committed to the false philosophical assumption of the myth of neutrality; i.e., math facts can be understood irrespective of the nature and character of the God who is the creator and sustainer of all things. **Grade: F**
- Does it reflect the beauty, wonder, and applicability of mathematics? It does not teach beauty very well. In fact, Saxon math teaches mathematics in a way that is antithetical to beauty. In this program, the student remains almost entirely ignorant of the wonder of mathematics and, because of this, math under Saxon rule is ugly and *no fun*. While we are discussing beauty, I am somewhat amazed (but not that surprised) that a great many Classical Christian schools, schools that embrace in their founding charters “Truth, Goodness, and Beauty” in all aspects of their school life and curriculum, *use Saxon Math!* As they say in math class, “Go figure.” **Grade: D-**
- Does it teach that mathematics is a tool of dominion? It reflects the “toolship” nature of mathematics, but does not recognize it. Some of the word problems show the application of the tools (in physics, chemistry, and biology), but on the whole, there is very little real world application. The program fails to incorporate the context of history and science (the physical world) in the development of the “tools” of mathematics although its goal is to prepare the student to use mathematics in the sciences! **Grade: C-**
- Does it found mathematical principles on concrete, largely physical contexts? Rules are usually given without a context. Individual topics are rarely introduced by motivating examples or explorative contexts. The “why” is minimized and the “how” is maximized. **Grade: D+**
- Does it encourage knowledge of the facts, understanding of the facts, and the application of wisdom to the facts? The program focuses almost entirely on “knowing the facts.” The program fails to understand the progression from knowledge to understanding to wisdom. In the high school level books, much of the instruction is still in the “grammar” (“give me the facts, ma’am”) stage and there is no complete text on deductive geometry or teaching the principles of logical analysis. In the context of the Classical approach to learning; i.e., the Trivium (three paths), knowledge is the *grammar* stage, understanding is the *dialectic* (logical) stage, and wisdom is the *rhetorical* stage. **Grade: C-**
- Does it reflect on the marvelous “unity and diversity” in mathematics? Topics are taught in a scattered, juxtaposed “hodge-podge” approach. Lessons are short and follow one another relentlessly. It is difficult to see the forest because of the attention to the individual trees. Because of a commitment to teaching “by increments,” it is very difficult to integrate the topics or create any coherent level of synthesis. Very little connections are explored and identified, both within the structure of mathematics and the resonance between abstract mathematics and the workings of the physical creation. **Grade: D+**
- Does it build upon foundations “line by line and precept by precept?” It “seems” to do so because of its “incremental” methodology. Since the goal of the program is to teach skill sets alone, “line upon line” is not going anywhere except toward the pragmatic goal of better test scores. Mortimer Adler’s analysis of the real goal of education is apropos, “The goal of teaching is to get students interested in

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the game of learning, not the game of passing.”³ In contrast, “line upon line, precept upon precept” teaching should focus on the goal of unfolding the intricate and beautiful structure of mathematics (skills sets learned in the context of the learning the structure of mathematics is part of the “understanding” stage of learning). Also, a student should be able to read and understand weighty, robust mathematical analysis (not just a cook book on mathematics). This means being able to read and follow the mathematical analysis of a Galileo, a Kepler, a Newton, an Euler, or a Gauss. You incrementally prepare the student for such a full-course meal, not by giving him atomized morsels (as in Saxon), but by lessons containing some real meat and that may take a student a couple of weeks to digest, a process that Saxon math textbooks would never “stomach.” **Grade: D+**

- It is rigorous and challenging? Yes. It is rigorous and challenging. You take this program and you will be prepared, in terms of skill-sets, for college-level mathematics. However, the rigor and the challenge are in the context of automation, not in the context of exploring God’s wonderful world and the place of mathematics in it (using intuition and reason). Professor Jongsma states that when a student trained in Saxon math takes his college courses, they are seriously lacking (1) logical and intuitive analysis skills and (2) intellectual curiosity (all they know how to do is to apply recipes). **Grade: C**
- Does it employ review? Perhaps too much. Once a topic is learned, continual review becomes non-productive. Review can be subtly employed by showing how the principle applies to learning a new principle. To do this requires a text that is structured properly and a teacher that really knows the subject, not just its tools. **Grade: B-**

If Saxon math is a short-term fix, then what is a long-term fix? A long term fix would be implementing a math program that would apply all of the principles articulated in the above bullet points. At present, *a program like this does not exist*. The author of this article is attempting to develop such a program. It will require considerable time and effort; it cannot be rolled out “short term.”⁴ It takes time, hard work, patience, careful study and analysis, writing and rewriting, and testing to produce materials that will generate long term results *Soli Deo Gloria*.

³ Mortimer Adler, *How to Read a Book: The Art of Getting a Liberal Education* (New York: Simon and Schuster, [1940] 1967), p. 14. I have seen far too many students, who get passing math scores on the SAT, who know nothing about the nature, structure, and beauty of mathematics. The SAT results say these students have learned math but I beg to differ.

⁴ Refer to www.biblicalchristianworldview.net for a status report on the author’s efforts.