WISKUNDE POST, A MATHEMATICAL MAGAZINE FOR STUDENTS SUPPORTING THE "MODERN MATHEMATICS" MOVEMENT IN FLANDERS

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ABSTRACT

In the 1960s, *Wiskunde Post*, a mathematical magazine for young people, played an important role in the promotion and dissemination of "modern mathematics" in Flanders. The initiative came from three enthusiastic mathematicians, Paul Bockstaele, Gaspard Bosteels and Roger Holvoet. The magazine covered topics in the history of mathematics, "traditional mathematics" and "modern mathematics", but the latter topics in particular were completely new to most readers, not only students but also their mathematics teachers. Many of them were first introduced to the mathematics of sets, relations, algebraic structures and topology through *Wiskunde Post*. Motivation for or applications of the new mathematics were largely lacking, however; it was primarily the mathematics itself that was supposed to captivate the magazine's readership.

1 Introduction

After WWII, mathematics magazines for young people appeared in many countries. Some notable examples (among many) are *Pythagoras* in the Netherlands, *Mathematical Pie* in the United Kingdom, *Le Facteur X* in France, *Kvant* in the Soviet Union, *La Scienza per I giovani* and *Angolo Acuto* in Italy, *Die Wurzel* in (East) Germany, *Euclid–Appendix of the Bulletin of the Hellenic Mathematical Society* in Greece. The main purpose of these magazines was to stimulate young people's interest in mathematics, sometimes also to prepare the most talented among them for studies in mathematical science (Aksenteva, 2000). To that end, these magazines presented mathematical puzzles, number games, challenging problems, beautiful or surprising results, elements from the history of mathematics, ... The scope of certain magazines included both mathematical and physical knowledge (e.g., *Le Facteur X*, *Kvant*, *La Scienza per I giovani*). Also, some of these magazines played an important role in the spread of "modern mathematics" in the 1960s (e.g., *Euclid–Appendix of the Bulletin of the Hellenic Mathematical Society*) (Baltzis, 2025). Mathematics journals for young people were rarely the subject of historical analyses; Guichelaar's (2017) study of *Pythagoras* is one of the rare exceptions. The focus of this paper is *Wiskunde Post* (*WP*) [Mathematics

Post], a "modern" mathematics magazine for secondary school students, published in Flanders, the Dutch-speaking part of Belgium, in the 1960s and early 1970s (Figure 1). But who were the initiators of *WP*? What content was covered? And, in what ways did *WP* support the "modern mathematics" movement in Flanders?

In the 1960s, the introduction of "modern mathematics" in secondary schools was in full preparation in Belgium. The main initiative to prepare Belgian teachers for the arrival of "modern mathematics" in their classrooms were the "Days of Arlon", a series of in-service teacher training courses organized annually from 1959–1968 in the city of Arlon in the very south of (French-speaking) Belgium (De Bock & Vanpaemel, 2019). Flemish mathematics teachers also participated in these courses, though to a lesser extent than their French-speaking colleagues. In this context, *WP* was created in the second semester of the 1961–1962 school year. It was intended for secondary school students, but it was also eagerly read by Flemish mathematics teachers; many of whom were introduced to "modern mathematics" by *WP*. On the first page of the first issue, we read about the new magazine's scope:

> We want to find a happy medium. A part of our issue will always be devoted to the history of mathematics, so that you can appreciate the acquisitions. Another part will be devoted to traditional mathematics, as it is taught to you, and finally, we will deal resolutely with the most modern mathematical views. (*WP, 1*(1)*,* p. 1)

The initiative to launch a magazine for students was not taken by an association of mathematics teachers, but came from three enthusiastic mathematicians who acted both as editors and main authors: Paul Bockstaele, Gaspard Bosteels and Roger Holvoet. Bockstaele (1920–2009) was a historian of mathematics with particular interest in the work of mathematicians from the Southern Low Countries in the 16th and 17th centuries (Vanpaemel, 2010). Before becoming a professor at the University of Leuven, he worked for some time as a mathematics teacher in a secondary school and as a teacher trainer. Bosteels (1909–2003) was also a mathematics teacher first, then became headmaster of a secondary school (Deelstra, 2023). Both Bockstaele and Bosteels were authors of successful mathematics textbooks. Holvoet (1938–1998) attended secondary school at the school where Bosteels was active and then went on to study mathematics at the *Université libre de Bruxelles* [Free University of Brussels], where he earned his PhD under the supervision of Georges Papy, the figurehead of the modern mathematics movement in Belgium (De Bock & Vanpaemel, 2019). Holvoet became a colleague of Bock-

staele as a professor of algebra at the University of Leuven. Each of these three initiators stood for one of the three tracks in *WP*, respectively, history of mathematics, "traditional mathematics", and "modern mathematics", but the latter predominated. Holvoet introduced his readers to the 20th-century mathematics of sets, relations, algebraic structures, linear algebra, topology, and discrete mathematics.

WP appeared until the second semester of the 1973–1974 school year; in total 53 issues were published, spread over twelve volumes: Vol. 1 in 1962 (three issues), Vols. 2–4 in 1962–1965 (six issues per school year); Vols. 5–12 in 1966–1974 (four issues per school year). The number of pages per issue ranged from 8 to 20; a total of 716 pages were published. No editorial explanation was ever given as to the reason(s) why the number of issues was reduced from six to four starting with Vol. 5, as well as why the magazine ceased publication after Vol. 12. *WP* had up to 8000 subscribers per volume, both from Catholic schools and from schools run by the State. It is also worth mentioning that *WP*'s financial profits were spent on scholarships for outstanding students in mathematics (Holvoet, 1989).

Figure 1. Header of Vols. 1–5 (1962–1967) of *WP*, visualizing the path from antiquity to modernity

2 Browsing in Wiskunde Post

2.1 The "history of mathematics" track

Bockstaele starts his historical chronicle in ancient Egypt and Babylonia ("4000 year old mathematics books"). In each article, he first provides some general historical information about the ancient civilizations before focusing on mathematical sources. Bockstaele's articles, always illustrated with photographs of authentic documents, appeal to *WP*'s young readership, and from time to time the author explicitly addresses his readers:

> Certainly there are some daring young readers of **Wiskunde Post** who dream of studying mathematics later, but also love languages and take an interest in history of science. Couldn't an Assyriologist-mathematician grow out of one of them? (*WP, 1*(2)*,* p. 2, bold in original)

Bockstaele continues his historical chronicle with ancient Greek mathematics, covered successively: "Thales of Miletus", "Pythagoras and the Pythagoreans", "Euklides", and "Archimedes", the latter supplemented with an article about "The history of the number Π". Bockstaele always tries to actively engage his readers in the reasoning of the ancient mathematicians.

In the first issue of Vol. 5 (1966), the researcher Bockstaele steps forward: He describes the contents of *Die manire om te leeren cyffren na die rechte consten Algorismi. Int gheheele ende int ghebroken* [The way to learn to cypher according to the right art of Algorismi, in whole and broken numbers], the oldest known Dutch cyphering book of 1508, printed and perhaps also compiled by the Brussels printer Thomas van der Noot. The book was repeatedly reprinted and also translated into French (Antwerp, 1529) and English (St. Albans, 1537). Bockstaele had previously published about this cyphering book in scholarly journals (Bockstaele, 1959, 1960), but the angle of his article in *WP* is to popularize historical science for young people. Bockstaele explains that ciphering books, aimed at teaching practical calculations and written in popular language, emerged at the end of the 15th century in wealthy commercial cities in northern Italy and southern Germany and, with the discovery of the art of printing, quickly became widespread, including in the Low Countries (see also Meskens, 2013). *Die manire* consists of three parts. The first treats the operations with integers (numeration, addition, subtraction, duplation (doubling), mediation (halving), multiplication and division), the second takes up the same operations with fractions, and the third is a collections of problems on, among others, the "ghulden reghel" [golden rule], i.e., the rule of three. Some of these problems are practical, others more recreational. Bockstaele invites his readers to solve one of the problems in *Die manire*:

> A drunkard drinks 1 aem (which is about 130 liters) of beer by himself within 14 days. If his wife drinks with him, they drink that aem together in 10 days. Now the question is: within how much time would his wife drink that aem alone? (*WP, 5*(1), p. 2, free translation)

However, he expresses the hope that his young readers will be more moderate than the "drunkard and his wife...". Although Bockstaele remains a member of the editorial board of *WP*, only a few of his contributions have been pub-

lished after this article (e.g., on how complex numbers made their appearance in mathematics, Vol. 7).

2.2 The "traditional mathematics" track

Gaspard Bosteels, who signed his contributions with G. Bosteels, G. B. or Gabos[1], showed a broad interest and expertise in various areas of mathematics. He was by far *WP*'s most prolific and versatile author. Vols. 11 and 12 were almost entirely written by him. To list all the topics he has covered in *WP* would lead us too far, we just mention a few: geometric properties that were beyond the scope of the secondary school curriculum (e.g., the nine-point circle), elementary logic (e.g., the link between conjunction and disjunction, on the one hand, and series and parallel circuits in electricity, on the other), physical laws and their translations into differential equations (e.g., Newton's law of cooling and heating), practical applications of mathematics (e.g., on the height of an access gate to allow a sleeper to enter a building), mathematics and economics (e.g., maximizing the income of a bus company), problems with a historical root (e.g., the trisection of an angle), various computational tricks and games (e.g., about quickly multiplying by certain numbers), subjects that were fashionable in the 1960s (e.g., the binary number system).

Like many "amateur mathematicians", Bosteels showed particular interest in special types of numbers and their properties: obviously prime numbers, but also Fibonacci numbers, Pythagorean triples, "lucky numbers" (= numbers generated by a certain "sieve" by analogy to the sieve of Eratosthenes), Lagado numbers (named after a fictional city in Gulliver's Travels), Mersenne numbers, and pentagonal numbers made their entrance in the columns of *WP*. With regard to these special numbers, there are still several unsolved problems that young people can easily understand (e.g., "so far, it remains an open question whether the sequence of Fibonacci numbers contains a finite or an infinite number of prime numbers", *WP, 2*(1), p. 7). With such topics and related problems, Bosteels was undoubtedly able to spark the interest and curiosity of *WP*'s readership.

From the third issue of Vol. 3, Bosteels started a dictionary of mathematical terms, including their Greek or Latin origin (where applicable), often also

[1] Among Flemish mathematics teachers, *Wiskunde Post* was therefore often called "Gabos magazine" (Deelstra, 2023).

with translations into French, English or German, and explanations of the symbolism used. However, he would not finish this project: the last contribution to "Gabos dictionary" appeared in the second issue of Vol. 11 (with some items beginning with the letter f).

2.3 The "modern mathematics" track

With an opening article on *Verzamelingenleer, een eerste kennismaking* [Set theory, a first introduction] in *WP, 1*(1), Holvoet set the tone:

> Often the young student has the impression that mathematics is an (ugly) building with several floors (arithmetic, algebra, geometry, trigonometry, etc.) where it is virtually forbidden to move from one floor to another. In reality, today's mathematics has a rigorous foundation: **the theory of sets**. All mathematicians of the whole world live **in the universe of sets.** The goal is to explain the elements of this so-important theory of sets. (p. 1, bold in original)

Perhaps for many teachers and students in Flanders, Holvoet's article was the first introduction to the theory of sets. Successively, Holvoet discusses: the origin of set theory, the concept of a set, the empty set, the equality of sets, and the representation of sets with Venn diagrams. A proof of the theorem "there is only one empty set" is included. In the second and third issues of Vol. 1, Holvoet continues his serial with the concepts of subset and set of subsets, and the operations on sets and their properties. In each case, the new concepts are accompanied by various examples and exercises.

In Vol. 2, Holvoet starts a new serial on the theory of relations "entirely built on set-theoretic foundations" (issue 1, p. 2). The representation with arrow diagrams is introduced and frequently used. The next issues will cover: equivalence relations and partitions, order relations, the Cartesian product, the composition of relations and its properties, functions as relations of a specific type, equipotence of sets, and permutations. Holvoet seems obsessed with the empty set (and the empty relation, actually another name for the same thing); they constantly pop up in examples and exercises (e.g., "the empty relation is the only permutation of the empty set", *WP, 3*(1), p. 4). To divide his articles into sections, Holvoet uses the binary number system instead of the decimal.

From the second issue of Vol. 3, the readers are introduced to algebraic structures: Holvoet starts a serial on linear algebra, in particular on vector spaces "which play a fundamental role, both in theoretical mathematics and in the applied sciences" (*WP, 3*(2), p. 1). Successively, the following topics are addressed: definition, properties, linear mappings, bases and dimension of a

vector space. The theory is illustrated with many examples and exercises, but the style is purely mathematical: concepts and symbols, theorems and proofs; examples from the "applied sciences" or other (external) motivations for the theory are not given to the magazine's young readership.

Topology is the subject of Holvoet's fourth serial on "modern mathematics"; it starts from Vol. 4. As a motivation, the author writes that topological structures give mathematical meaning to intuitive concepts, such as neighborhood, continuity and limit, which initially played an important role in approximation problems. However, he continues, "we will detach ourselves from the real numbers and obtain statements independent of the concept of distance" (*WP, 4*(1), p. 5). Consecutive topics covered are: neighborhoods, open sets, bases of a topology, continuous mappings, homeomorphisms. Concepts are defined and theorems formulated in general topological spaces; "concrete examples" are framed in topologies of the plane, space, the set of real numbers, finite sets, ... Topics that might appeal to young people, e.g., non-orientable surfaces like the Möbius strip or Klein's bottle, are not included.

Holvoet's fifth serial, included in Vol. 5, deals with combinatorics, a branch of discrete mathematics. The author first repeats some elements of the theory of relations (particularly mappings) and then uses that theory to address: variations with and without repetition, permutations and combinations. Several theorems are proved on a set-theoretic basis, including that for all natural numbers n, it holds that $n^0 = 1$ (implying $0^0 = 1$; indeed, there exists exactly one mapping from the empty set to the empty set, namely the empty relation). The theory is illustrated with several counting problems, all but one presented within a purely mathematical context. The opportunity to show some practical applications of combinatorics is not taken, probably a deliberate choice in line with Holvoet's view of mathematics and mathematics education. Interestingly, the final issue of Vol. 5 includes an article proposing an axiomatic approach to probability theory. However, it is not written by Holvoet but by Frank Laforce, a mathematics teacher who would become the first president of the Flemish Association of Teachers of Mathematics in 1975.

A new serial in Holvoet's crash course on "modern mathematics" is about monoids and groups (Vol. 6, issues 2 and 3). In his introduction, the author refers to the importance of groups (mainly in higher physics):

> In the 20th century, group theory is indispensable both to the mathematician, and to the mathematics user. Important applications of groups are found, for example, in *crystallography* (crystal groups), in *nuclear physics*, in *quantum theories* (or-

> thogonal groups), in *relativity theory* (Lorentz group), in *commercial sciences* (homology groups). (*WP, 6*(2), p. 1, italics in original)

Unfortunately, Holvoet was unable to illustrate any of these applications at a level suitable for the young readers of *WP*. Holvoet's new serial, entitled "Groups 1", was also shorter than expected: only two articles were published and "Groups 2" would never appear...

In the third issue of Vol. 7, which appeared in the 1968–1969 school year when, with few exceptions, "modern mathematics" was introduced in all first years of general secondary education in Flanders, Holvoet writes again about relations ("Contemporary mathematics is *relational*: we study *sets* connected by *relations*", *WP, 7*(3), p. 1, italics in original). He focusses on the properties of relations and on the correct use of quantifiers to formulate these properties. The article seems to respond primarily to a direct need of teachers who now had to teach "modern mathematics" in their classrooms. More interestingly, in Vol. 8 (issue 2), Holvoet writes about infinite cardinal numbers. He first sketches the historical context: From Georg Cantor's work on infinite cardinal numbers to some (in the 1960s very) recent results (e.g., regarding the continuum hypothesis). In the subsequent sections he provides a modern account of some of Cantor's results.

In Vol. 9, Holvoet announces a follow-up of the serial he had started in Vol. 6 on algebraic structures. It is entitled "From PX (= the set of subsets of the set X) to groupoids, monoids, groups, rings. 1", but unfortunately only one article appears (in the second issue) and rings are not discussed (though they are discussed in the same issue by Bosteels). The emphasis in Holvoet's article is more on introducing modern mathematical jargon than on new content, for example, he distinguishes between a groupoid (a set with an internal law), a semigroup (if that law is also associative), a monoid (if, in addition, there is a neutral element), a commutative monoid, and a group. Holvoet seems to lack inspiration, time or interest; only one more of his articles will appear in subsequent volumes of *WP* (on Fermat's prime numbers, in the second issue of Vol. 12). However, articles on "modern mathematics" were still published in *WP*, but by other authors (Bosteels, Laforce, ...).

In sum, Holvoet offered the readers of *WP* a clear overview of the (naive) theory of sets and relations, as well as an introduction to algebraic and topological structures, topics that were considered of utmost importance in the "modern mathematics" era. Each time, he illustrates the new concepts with

numerous mathematical examples and exercises. However, his articles seem more fodder for teachers than for students, and for teachers Holvoet provides little material to "sell" the "new mathematics" to their students (real-world applications, intriguing problems, historical roots, ...). The motivation had to come mainly from the new mathematics itself. For geometry, a subject on which the reformers of the 1960s were neither very enthusiastic nor in agreement (see, e.g., De Bock & Vanpaemel, 2019), readers were left hungry....

3 Epilogue

The "modern mathematics" movement in Belgium was led by Francophones, particularly by Papy. Although Papy's groundbreaking textbook series *Mathématique Moderne* (Papy, 1963–1967) was translated into Dutch (with the exception of Vol. 6), the translation of the first volume did not appear until 1965 and was not an easy read for a "first introduction" to the new mathematics. In Flanders, this gap was largely filled with *Wiskunde Post*, a magazine that emphasized "modern mathematics" but combined this with articles on "traditional mathematics" and history of mathematics, making it appealing to students and their teachers. Especially in the early years, the initiators succeeded in sparking an interest and love for mathematics in many students in Flanders (Deelstra, 2023). In the early 1970s, however, the enthusiasm of the initiators waned and the magazine died in silence with Vol. 12 (1973–1974). For teachers this gap was soon bridged: already in 1975 the first issue of *Wiskunde & Onderwijs* appeared, the first Flemish journal for mathematics teachers. A new initiative for a youth magazine on mathematics has not been taken in Flanders since. As an alternative, some Flemish secondary school students, encouraged by an enthusiastic mathematics teacher, subscribed to the Dutch magazine *Pythagoras*.

SOURCES

Wiskunde Post, 1962–1974. Vols. 1–5 (1962–1967) were published by *S.M. Ontwikkeling* (Antwerp); Vols. 6–12 (1967–1974) by *De Sikkel n.v.* (Antwerp). Complete collection in authors' possession.

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