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## THE CIRCULATION OF WOLFF'S ELEMENTS OF MATHEMATICS THROUGH ITS COMPENDIA

**Summary:** Christian Wolff's *Der Anfangs-Gründe Aller Mathematischen Wissenschaften*, published in Halle in 1710, gained popularity in the 18th c. through various editions, translations, and compendia. These were prepared by Wolff and other university educators for classroom use and included materials selected from German or Latin editions. This article explores its dissemination across Europe by analyzing two Vienna compendia from the late 18th c., which illustrate Wolff's educational impact.

**Keywords:** Wolff, history of mathematics education, circulation of mathematical knowledge, textbooks, elementary geometry, 18th century

### Introduction

Christian Wolff's<sup>1</sup> influence on 18th c. German and European thought has long been recognized<sup>2</sup>. Recent scholarship has also emphasized<sup>3</sup> Wolff's significance

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<sup>2</sup> See, e.g., T. Frangsmyr, *Christian Wolff's Mathematical Method and Its Impact on the Eighteenth Century*, "Journal of the History of Ideas" 1975, vol. 36, no. 4, p. 653; *Handbuch Christian Wolff*, ed. by R. Theis, A. Aichele, Springer Fachmedien Wiesbaden, Wiesbaden 2018; D. Crippa, *Christian Wolff's Elementa Matheseos Universae, Methodology, and Mathematical Education*, [in:] *Mathematical Book Histories*, ed. by P. Beeley, C. Mac An Bhaird, Springer, Cham 2024, p. 73–111.

<sup>3</sup> See L. Shabel, *Mathematics in Kant's Critical Philosophy: Reflections on Mathematical Practice*, Routledge, New York 2003; G. Schubring, *Conflicts between Generalization, Rigor, and*

for the circulation of mathematical knowledge across 18th c. Europe. Wolff's mathematical *magnum Opus* was his encyclopedic textbook on the Elements of Mathematical Sciences, published in German as *Der Anfangs-Gründe Aller Mathematischen Wiensenschaften* (1710, henceforth *Anfangsgründe*)<sup>4</sup>, and translated and enriched a few years later as *Elementa matheseos universæ* (1713–1715, henceforth: *Elementa*)<sup>5</sup>. This work was followed by the *Mathematisches Lexicon* [Mathematical Lexicon] (1716). Thanks to multiple successful editions and translations, Wolff's Elements, in both German and Latin, became a precious resource for understanding how mathematical ideas were disseminated and taught in the 18th c. A crucial but underrated vehicle of this dissemination was the compendia, abridged and adapted versions of the *Anfangsgründe* or the *Elementa*, written either by Wolff himself or by other instructors for the needs of Gymnasium or university classrooms. The first compendium was prepared by Wolff himself with the following title: 'Excerpt from the Foundations of All Mathematical Sciences: For the Convenience of Beginners, Upon Request' (hereinafter, *Auszug*)<sup>6</sup>. Wolff's *Auszug* turned out to be a successful publication that underwent 14 reprints during the 18th c.<sup>7</sup> and several translations in Latin and the vernacular<sup>8</sup>.

Although these texts have received comparatively little attention in historiography, they played a crucial role in the spread of Wolff's mathematics because they were in greater demand than Wolff's *Anfangsgründe* and its Latin translations, often less affordable<sup>9</sup>. Moreover, thanks to the compendia, Wolff's mathematics circulated across both Protestant and Catholic regions, raising questions about how his ideas were adapted within different institutional settings<sup>10</sup>.

This article investigates how Wolffian ideas on method and rigor, and pedagogy were transmitted and reshaped within Habsburg universities in the second half of the 18th c., especially thanks to the circulation of compendia. Two compendia

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*Intuition: Number Concepts Underlying the Development of Analysis in 17th–19th Century France and Germany*, Springer, New York 2005; S. Nobre, *Christian Wolff (1679–1754) and His Contribution for the Mathematics Education*, [in:] *Studies in History of Mathematics Dedicated to A.P. Youschkevitch*, ed. E. Knobloch, J. Mawhin, Brepols Publishers, Turnhout 2002, p. 89–94.

<sup>4</sup> See C. Wolff, *Der Anfangs-Gründe aller mathematischen Wissenschaften*, 4 vols., Renger, Halle 1710.

<sup>5</sup> See C. Wolff, *Elementa matheseos universæ*, 2 vols., Renger, Halle 1713–1715.

<sup>6</sup> C. Wolff, *Auszug aus den Anfangs-gründen aller mathematischen Wissenschaften. Zu bequemern Gebrauche der Anfänger auf Begehren*, Renger, Halle 1717.

<sup>7</sup> See S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, Shaker, Aachen 2002, p. 305–314.

<sup>8</sup> *Ibidem*, p. 41.

<sup>9</sup> See H. Kuhn, *Die Mathematik im deutschen Hochschulwesen des 18. Jahrhunderts: unter besonderer Berücksichtigung der Verhältnisse an der Leipziger Universität*, PhD dissertation, Leipzig University, Leipzig 1988, p. 67 and below footnote 27.

<sup>10</sup> See G. Mühlpfordt, *Christian Wolffs Lehre im Östlichen Europa*, "Aufklärung" 2001, vol. 12, no. 2, p. 77–100.

shall be examined in particular: ‘*Mathesis Wolfiana* for the use of the studious youth through the hereditary lands of Austria, prescribed by the higher commission [...] including arithmetic, geometry, and trigonometry, together with algebra applied to each of these parts’<sup>11</sup> [hereinafter, *Mathesis Wolfiana*], and its German translation<sup>12</sup> [hereinafter *Mathematik des Wolf*], both published in Wien.

By examining these works, the study aims to clarify both the concrete mechanisms through which Wolffian mathematics entered Habsburg curricula and the transformations it underwent in this institutional context.

### The European circulation of Wolff's *Elements of Mathematics* German and Latin editions

Christian Wolff's *Anfangsgründe* was first published in 1710 in Halle, where Wolff had obtained the chair of mathematics at the local university in 1707<sup>13</sup>. Through this ambitious four-volume work, Wolff aimed to create ‘a smooth and straight path to a thorough knowledge of all mathematical sciences for our Germans (*unseren Teutschen*)’<sup>14</sup>. The *Anfangsgründe* included the totality of mathematics understood as the ‘science of quantities’, and it was intended for both ‘higher and lower schools’ (‘auf hohen als niedrigen Schulen’), namely universities and gymnasia.

Wolff's *Anfangsgründe* was an editorial success, as shown by numerous German editions and reprints, until the beginning of the 19th c.<sup>15</sup>

With a new Latin edition, which Wolff himself prepared in 1713–1715, in two volumes<sup>16</sup>, Wolff aimed to reach a broader audience beyond the German-speaking regions. Between 1730 and 1741, Wolff published the second Latin edition of *Elementa*, expanding from two volumes in the first edition to five volumes<sup>17</sup>.

<sup>11</sup> C. Wolff, J.A. Nagel (transl.), *Mathesis Wolfiana in usum juventutis scholasticae per terras haereditarias Austriacae domus a Suprema Studiorum Commissione praescripta [...] complectens arithmetica, geometria, et trigonometria, una cum algebra ad unamquamque harum partium applicata*, Trattner, Wien 1776.

<sup>12</sup> C. Wolff, J.A. Nagel (transl.), *Mathematik des Freyherrn Christian von Wolf. Ein Auszug aus dem ersten Theile seiner Elementa Matheseos Universæ: Worinnen die Rechenkunst, Geometrie, Trigonometrie, Algebra [...] enthalten ist*, Trattner, Wien 1777.

<sup>13</sup> See S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 16–17.

<sup>14</sup> From the preface: ‘Da Ich nun unseren Teutschen in den gegenwärtigen *Anfangsgründen aller mathematischen Wissenschaften* einen ebenen und geraden Weg zu einer gründlichen Erkenntnis bahne’ (C. Wolff, *Der Anfangsgründe aller mathematischen Wissenschaften*, Renger, Halle 1710, p. 3).

<sup>15</sup> See S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 38–39.

<sup>16</sup> C. Wolff, *Elementa matheseos universæ*, 2 vols., Renger, Halle 1713–1715.

<sup>17</sup> C. Wolff, *Elementa matheseos universæ. Editio nova priori multo auctior et correctior*, 5 vols., Renger, Halle 1730–1741.

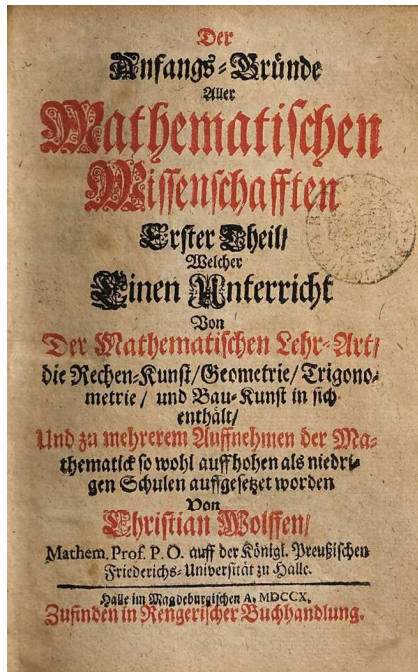


Fig. 1. C. Wolff, *Der Anfangs-Gründe aller mathematischen Wissenschaften*, Renger, Halle 1710.

Source: Deutsches Textarchiv, [https://www.deutsches-textarchiv.de/wolff\\_anfangsgruende01\\_1710/7](https://www.deutsches-textarchiv.de/wolff_anfangsgruende01_1710/7) [accessed 20.01.2026].

Two Latin editions followed: one was published in Geneva between 1732 and 1741 by Swiss printer Bousquet et Socios<sup>18</sup>, and the other was printed in five volumes in Verona between 1746 and 1754 as part of a broad project led by Gaetano Serer and Giuseppe Marzagaglia to have all Wolff's Latin works published in Italy<sup>19</sup>. The Veronese edition was dedicated to Wolff by Giuseppe Marzagaglia.

With the translation of *Anfangsgründe* into Latin, the order of the subjects and the content of the book underwent substantial changes, reflecting their distinct target audiences. Wolff's *Elementa* was designed for more advanced readers and students of philosophical faculties and thus featured an expanded theoretical section with more detailed proofs. In contrast, as Wolff himself explained in the second edition of the *Elementa*, the German *Anfangsgründe* included only the proofs necessary for beginners and devoted more space to practical mathematics and applications<sup>20</sup>. Another key difference between *Elementa* and *Anfangsgründe* concerns the positions of finite analysis (algebra) and infinitesimal analysis (differential and integral calculus).

In the German editions, these subjects form the fourth and last volume, while in the Latin editions they appear in the first volume, having become part of pure mathematics, together with arithmetic, geometry, and trigonometry.

Wolff also made changes to the second Latin edition of *Elementa* with respect to the first. Apart from an expanded part on 'mixed mathematics'<sup>21</sup>, the second

<sup>18</sup> C. Wolff, *Elementa matheseos universæ. Editio nova priori multo auctior et correctior*, 5 vols., apud Marcum-Michaelem Bousquet, Geneva 1732–1741.

<sup>19</sup> See D. von Wille, *La fortuna delle opere di Christian Wolff in Italia nella prima metà del Settecento: la prima edizione Veronese degli Opera Latina*, "Rivista di Storia della Filosofia" 1995, vol. 50, no. 2, p. 369–400.

<sup>20</sup> C. Wolff, *Elementa matheseos universæ*, vol. 5, Halle 1741, p. 11.

<sup>21</sup> S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 42.

Latin edition added a *Commentatio de studio mathematico recte instituendo*, a commentary on the way mathematics should best be learned, which occupies almost the whole fifth volume and complements the introduction on mathematical method that opens the first volume.

Wolff's *Anfangsgründe* was also translated into several vernacular languages such as Dutch<sup>22</sup>, Spanish<sup>23</sup>, French<sup>24</sup>, and English<sup>25</sup>. Translations and abridgments of Wolff's *Elementa* into Polish, Swedish, and Russian are also mentioned in the secondary literature, attesting to the wide circulation of Wolff's mathematics<sup>26</sup>.

### *Circulation of Wolff's mathematics through the Compendia*

A pedagogical disadvantage of Wolff's mathematical course was that it lacked practicality for classroom use because of its cost and length, which contrasted with the limited time allotted to mathematics in the school curricula and the limited economic possibilities of many students<sup>27</sup>. Thus, on the demand of his students in Halle, Wolff prepared a compendium, the *Auszug*, in 1717.

The volume consisted of excerpts 'for the convenient use of beginners'. The category of 'beginners' was less sharply defined than in our modern school systems. Wolff explicitly stated that he had in mind a young audience (*kleine Knaben*)<sup>28</sup>, but the book was often used by first-year university students, during a time when pupils entered universities at about the age of 16 or slightly earlier<sup>29</sup>.

<sup>22</sup> A Dutch translation of the German *Anfangsgründe* with the title *Grondbeginzelen van alle de mathematische Wetenschappen* was published in 1738.

<sup>23</sup> Personal communication, M. Blanco.

<sup>24</sup> See L. Holmberg, *The Unknown Rival of the Encyclopédie*, "Frühneuzeit-Info" 2013, vol. 24, p. 81–89.

<sup>25</sup> C. Wolff, *A Treatise of Algebra, with the Application of it to a Variety of Problems in Arithmetic, to Geometry, Trigonometry, and Conic Sections: With the Several Methods of Solving and Constructing Equations of the Higher Kind*, transl. by J. Hanna, Printed for A. Bettesworth and C. Hitch, London 1739.

<sup>26</sup> See S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 40.

<sup>27</sup> These motivations are stated in the preface of the first 1717 Compendium: 'Derowegen weil vielen meine AnfangsGründe der mathematik weitläufig geschienen als daß sie mit Anfängern in der gemeinlich ihnen vorgesezten Kürze der Zeit könnten durchgegangen werden; über dieses auch einigen zu theuer vorkommen/und daher begehret worden/daß ich einen Auszug zu bequemerem Gebrauche der Anfänger sonderlich auf Schulen verfertigen möchte', C. Wolff, *Auszug aus den Anfangsgründen aller mathematischen Wissenschaften. Zu bequemerem Gebrauche der Anfänger auf Begehren*, Renger, Halle 1717, *Vorrede*, p. 4.

<sup>28</sup> See T. Morel, 'Yet you know that there is only one Euler'. *Andreas Böhm (1720–1790) and the Practice of Mathematics at German Universities*, "Revue d'histoire des mathématiques" (accepted, forthcoming), vol. 31, no. 1, p. 1–67.

<sup>29</sup> Up to the 17th c., the age of admission could vary between 14 and 16 years old (see, e.g., the case of Wien: T. Maisel, *Studenten im Mittelalter und in der Frühen Neuzeit*, <https://geschichte.univie.ac.at/de/themen/studenten-im-mittelalter-und-der-fruehen-neuzeit> [accessed 22.01.2026]). This age was probably higher in the 18th c., especially with reforms that restructured lower educa-

Wolff also offered private instruction and likely intended the compendium to support students in private settings. More broadly, throughout the 18th c., Wolff's compendia circulated well beyond the university and were used in Gymnasia and military schools in Prussia, Poland, and Austria, as attested by numerous teachers and students<sup>30</sup>.

A Latin compendium from the second edition of Wolff's *Elementa* was published in Geneva in 1742<sup>31</sup>. It was prepared and dedicated to Wolff by physicist Samuel König (1712–1757), a former student of his in Marburg who was residing in Bern when the compendium appeared<sup>32</sup>. In the dedicatory preface, König stated that he was consulted by Swiss editor Bousquet and expressed his belief in the pedagogical value of Wolff's mathematical work. He emphasized the benefits of a summary of *Elementa Matheseos* for teachers and students proficient in Latin, similar to the advantages *Anfangsgründe* provided for German readers.

König's ideal proved to be correct: the Swiss compendium was republished in Verona in 1744 (by Ramazzini), Lausanne in 1758, Geneva in 1773 and 1778, Wien in 1774, Halle in 1775, and Venice in 1775, the latter based on both the Lausanne and Verona editions.

The European circulation of Wolff's mathematics was also enhanced by compendia prepared by other teachers, independent of Wolff but inspired by him. This is the case with the book titled *Lineae primae matheseos in usum auditorii privati ductae* (Königsberg 1736) by Christian Friedrich Ammon, which was used for his lectures in mathematics at Albertina in Königsberg between 1736 and 1742<sup>33</sup>. Another compendium circulating in the second half of the 18th c. was titled *Praelectiones Mathematicae in Wolfianis Elementis adornatae atque sic usui*

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tion. See T. Morel, M. Bullynck, *Une révolution peut en cacher d'autres. Le paysage morcelé des mathématiques dans l'espace germanophone et ses reconfigurations (1750–1850)*, [in:] *Sciences Mathématiques 1750–1850. Continuités et ruptures*, ed. by C. Gilain, A. Guilbaud, CNRS Editions, Paris 2015, p. 185.

<sup>30</sup> For the use of Wolff's *Auszug* in military schools, see J. Kinsky's manuscript notes on geometry (J. Kinsky, *Elementar-Geometrie in sich enthaltend die Eutimetrie und Epipedometrie*, Národní knihovna České republiky, Prague, shelfmark Kinskyana\_F.I.256, Manuscriptorium, [https://www.manuscriptorium.com/apis/resolver-api/cs/catalog/default/detail/manuscriptorium%7CRASTIS-NKCR\\_KINSKYANAFI200X2GO1-cs](https://www.manuscriptorium.com/apis/resolver-api/cs/catalog/default/detail/manuscriptorium%7CRASTIS-NKCR_KINSKYANAFI200X2GO1-cs) [accessed 18.01.2026]). Kinsky probably drafted these notes for the Austrian military academy at Wiener-Neustadt. See T. Šek Brnardić, *The Upbringing of Competent and Patriotic Officers: Military Education at the Theresian Military Academy in Wiener Neustadt (1752–1805)*, PhD dissertation, 2017.

<sup>31</sup> C. Wolff, *Compendium elementorum matheseos universae; in usum studiosae juventutis adornatum*, 2 vols., Bousquets and Society, Lausanne 1742.

<sup>32</sup> S. Günther, *König, Samuel*, [in:] *Allgemeine Deutsche Biographie* 1882, vol. 16, p. 521–522, Online version, <https://www.deutsche-biographie.de/pnd117528854.html#adbcontent> [accessed 1.01.2026]. The bibliography does not mention König's involvement with Wolff's *Compendium*.

<sup>33</sup> S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 252.

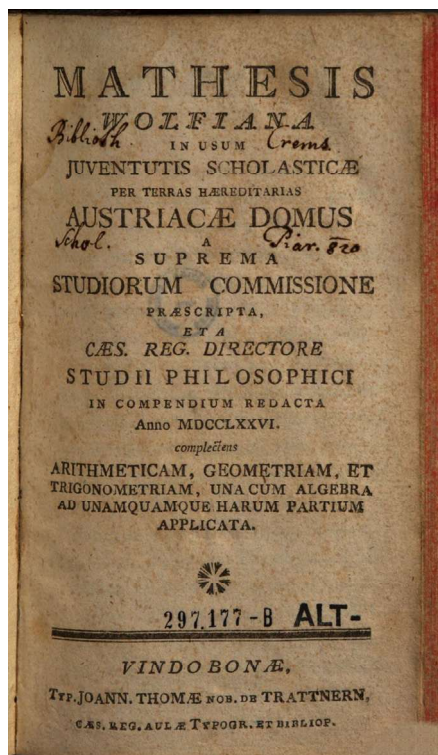


Fig. 2. Title page of *Mathesis Wolfiana*, 1776.

Source: <https://data.onb.ac.at/rep/1084BFEA> [accessed 20.01.2026].

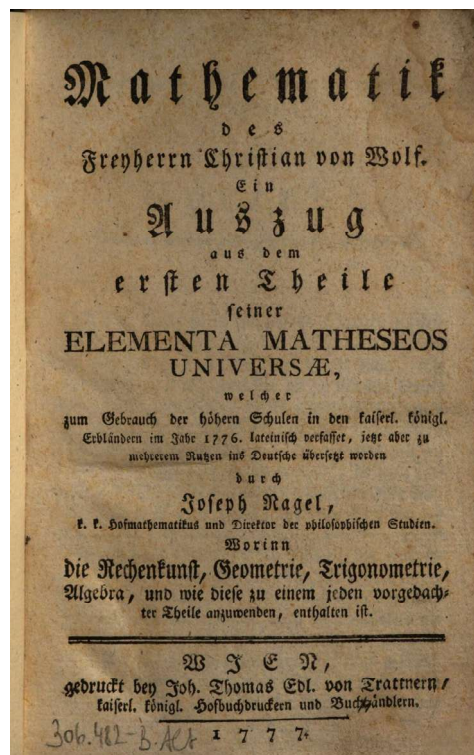


Fig. 3. Title page of *Mathematik des Wolf*, 1777.

Source: <https://data.onb.ac.at/rep/1037B7E1> [accessed 20.01.2026].

*auditorum Matheseos accomodatae* (1761), which was published in Vilnius by the Jesuit teacher Jakob Nakcyanowicz (1725–1777), and used for his university lectures<sup>34</sup>.

Two further examples are the compendia published by the Viennese printer Trattner mentioned above: *Mathesis Wolfiana* (Fig. 2), and *Mathematik des Wolf* (Fig. 3).

From the title page of *Mathematik des Wolf* we learn that the editor's name was Joseph Anton Nagel (1717–1794). Nagel was the director of physical and

<sup>34</sup> On Nakcyanowicz, see: W. Więśław, *Mathematics at Polish Universities (Cracow and Vilnius) in XVIII Century*, [in:] *Mathematics throughout the Ages*, ed. by E. Fuchs, Prometheus, Praha (Prague) 2001, p. 101–121; K. Karpińska, *Gnomonics in Secondary School Education in the Territories of Poland in the 17th–20th Centuries*, [in:] *Advances In The History Of Mathematics Education*, ed. by A. Karp, Springer, New York 2022, p. 131–170.

mathematical studies in Vienna when the books were published<sup>35</sup>. Through his intervention, *Mathesis Wolfiana* was adopted as the official textbook in the universities of the Habsburg lands after 1774, and until 1784, when the official language of higher education became German<sup>36</sup>.

### Wolff's mathematics in the Habsburg lands

Wolff's compendia, published in Austria, were a direct consequence of the suppression of the Jesuit order in 1773. This was a major institutional change that created a void in the organization of philosophy and theology faculties at Habsburg universities, where members of the Society of Jesus occupied important chairs and crucial institutional positions<sup>37</sup>.

In the Habsburg lands, mathematics was a part of philosophical studies, forming the first compulsory two years for all university students. Although most Jesuit mathematics and science teachers kept their chairs after the order's suppression, syllabi and textbooks for philosophical faculties were centralized under the Commission on Education<sup>38</sup>. In this new context, *Mathesis Wolfiana* was selected as a university mathematics textbook. A closer look at this compendium and its German adaptation can provide further information on their social and institutional contexts as well as on their ideal readership. First, let us examine *Mathesis Wolfiana*'s frontispiece. The title reminds the 1742 Swiss Latin compendium with the explicit inclusion of its intended readership: 'studiosa iuventus' (namely, 'students') in 1742, and *iuventus scholastica*, young men in their first year of university, in 1776. It is possible that the book was planned for a wider readership, or ended up being used outside universities anyway. In Austria, during the second half of the 18th c., textbooks prepared for higher education often ended up being used in gymnasia to fill the gap between lower and higher education<sup>39</sup>.

<sup>35</sup> See Nagel, Joseph Anton, [in:] *Biographisches Lexikon des Kaiserthums Oesterreich* (BLKÖ) 1869, vol. 20, p. 31, [https://de.wikisource.org/wiki/BLK%C3%96:Nagel,\\_Joseph\\_Anton](https://de.wikisource.org/wiki/BLK%C3%96:Nagel,_Joseph_Anton) [accessed 9.06.2025].

<sup>36</sup> Wolff was not completely put aside. For instance, the syllabus from the year 1786–1787 at the University of Freiburg mentions that Wolff's *Anfangsgründe* (not the compendium) was the official textbook for teaching mathematics [http://dl.ub.uni-freiburg.de/diglit/vvuf\\_1786-1787/0006](http://dl.ub.uni-freiburg.de/diglit/vvuf_1786-1787/0006) [accessed 18.11.2025].

<sup>37</sup> D. Crippa, *Teaching Elementary Mathematics at the University of Prague. A Study of Latin Compendia from the Second Half of the 18th Century*, "Almagest" 2022, vol. 13, no. 1, p. 117. The Jesuits also dominated secondary education, especially gymnasia, a topic that won't be considered in this article. See F.M. Brueckler, V. Stilinović, *Teaching Arithmetic in the Habsburg Empire at the End of the 18th Century – A Textbook Example*, "Historia Mathematica" 2013, vol. 40, no. 3, p. 309–323.

<sup>38</sup> See J. Van Horn Melton, *The Theresian School Reform of 1774* [in:] *Early Modern Europe*, ed. by J.B. Collins, K.L. Taylor, Wiley-Blackwell, Malden, MA 2006, p. 55–68.

<sup>39</sup> See I. Jaklin, *Das österreichische Schulbuch im 18. Jahrhundert. Aus dem Wiener Verlag Trattner und dem Schulbuchverlag*, Edition Praesens, Wien 2003, p. 206.

The frontispiece of *Mathesis Wolfiana* also alludes to its distribution across the 'hereditary lands' (or '*Erblände*'), a term that in the 18th c. indicated the Austrian provinces and Bohemia<sup>40</sup>, while excluding Galicia, Hungary, the possessions in Italy, and the Austrian Netherlands, where the book was not mandatory. The frontispiece also indicates that the book bore the seal of official approval as mandated by the Commission on Education.

The 1777 *Mathematik des Wolf* is a translation of *Mathesis Wolfiana*. Besides mentioning Nagel's name in the title page, this edition also explicitly refers to the source of both compendia, namely, the first volume of Wolff's *Elementa Matheseos*. Moreover, the title adds that the compendium was translated from Latin into German 'for further benefit to readers'<sup>41</sup>. A German translation could reach readers who pursued private education outside universities (where lectures were held in Latin) or institutions where education was pursued in German, such as military and technical academies<sup>42</sup>.

The structure adopted in *Mathesis Wolfiana* and its German translation follows Wolff's division of mathematics in the first volume of *Elementa Matheseos*. This volume covers 'pure mathematics', which was constituted, according to Wolff, by arithmetic, geometry, trigonometry, and 'mathematical analysis'<sup>43</sup>. As we saw above, moving the section on analysis to the first volume was the major editorial change with respect to *Anfangsgründe*. According to Wolff, who followed the early modern tradition, analysis did not represent a separate discipline, but a method of problem solving<sup>44</sup>. In *Elementa Matheseos*, analysis included both 'specious arithmetic', namely the technique of 'calculus with indeterminate quantities and numbers', and 'algebra'. Algebra denotes the techniques of problem solving based on the construction of equations<sup>45</sup>, which are then applied to solve problems in all areas of mathematics.

<sup>40</sup> See M. Hochedlinger, *Austria's Wars of Emergence. War, State and Society in the Habsburg Monarch, 1683–1797*, Routledge, Abingdon, Oxon, New York 2013, p. xvii.

<sup>41</sup> As the original frontespice says: 'jetzt aber zum mehrerem Nutzen ins Deutsch ubersetzen worden'.

<sup>42</sup> The existence of a manuscript course by J. Kinsky demonstrates that German was used as a language of instruction in the military academy of Wiener Neustadt (see footnote 30). Moreover, in Prague C. Bartl allegedly provided a short-lived introductory course in mathematics in German (J. Dobrovský, *Böhmische Litteratur auf das Jahr 1779: Ersten Bandes. Ersten Stück*, Verlag der Mangoldischen Buchhandlung, Prague 1779, p. 262).

<sup>43</sup> According to Wolff's *Lexicon, Mathesis Pura* treated quantity 'as such' and included arithmetic, geometry, trigonometry and algebra (C. Wolff, *Mathematisches Lexicon*, bey Joh. Friedrich Gleditschens seel. Sohn, Leipzig 1716, p. 864). The term was currently used in 18th c. textbooks to denote these disciplines (see also D. Crippa, *Teaching Elementary Mathematics at the University of Prague*, p. 97).

<sup>44</sup> See C. Wolff, *Elementa Matheseos*, Halle 1730–1741, vol. 1, df. 1, § 1, p. 297.

<sup>45</sup> 'Algebra est methodus resolvendi problemata per aequationes' (C. Wolff, *Elementa Matheseos*, Halle 1730–1741, vol. 1, df. 5, §132, p. 341).

*Mathesis Wolfiana* and its German translation have the same structure. They begin with an introduction that summarizes the ‘short commentary on the method’, opening the *Elementa Matheseos*, and go on to cover pure mathematics following Wolff’s *Elementa*. Separate chapters are dedicated to ‘mathematical analysis’ and its applications to pure mathematics<sup>46</sup>. As the titles of the compendia recall, the subjects of application of analysis in the compendia are arithmetic and geometry, the latter including trigonometry as well<sup>47</sup>. Unlike *Elementa Matheseos*, the compendia did not include infinitesimal analysis, a topic that was presumably considered too advanced for university classes.

The placement of analysis within the section on pure mathematics mirrors the ordering of subjects in Wolff’s Latin *Elementa Matheseos*, but also reflects a shift in the structure of university mathematical instruction, especially when contrasted with the 1742 Latin compendium and Wolff’s first German compendium of 1717. In these earlier works, following the organization of Wolff’s *Anfangsgründe*, analysis appears only at the end of the second volume, after an extensive treatment of mixed mathematics, namely optics, mechanics, geography, etc. This ordering may reflect Wolff’s own pedagogical views, at least those expressed in his *Anfangsgründe*: analysis was treated as the last subject because it was considered an overarching and advanced method of discovery that presupposed the mastery of the previous subjects in pure and mixed mathematics. In *Elementa Matheseos*, Wolff did not adhere to the same view, perhaps because the book was directed to a public that already possessed a mathematical background.

The arrangement of subjects presented in *Mathesis Wolfiana* mirrored Wolff’s *Elementa Matheseos*, but also the pedagogical practices and disciplinary order in university teaching in the Habsburg lands after 1774. At that time, an important reform of education reorganized university studies, following the abolition of the Jesuit order<sup>48</sup>. As we can see from the syllabi, analysis as a method of problem-solving applied to arithmetic and geometry has become a standard topic in the first-year curriculum of philosophical studies<sup>49</sup>. Mixed mathematics, in contrast, was reserved for the second year and certainly not taught via *Mathesis Wolfiana*. Teachers may have relied on their own notes or Wolff’s 1742 Swiss Compendium, which included mixed mathematics.

Overall, this alignment between the syllabi, Wolff’s *Elementa*, and Nagel’s compendia indicates that the structure of university mathematics bore a distinct Wolffian imprint.

<sup>46</sup> *Elementa analysis mathematica* in Latin and, in German, *Anfangsgründe der mathematischen Auflösungskunst*.

<sup>47</sup> See C. Wolff, *Mathesis Wolfiana*, p. 403–460, 493–497.

<sup>48</sup> D. Crippa, *Teaching Elementary Mathematics at the University of Prague*, p. 102ff.

<sup>49</sup> *Ibidem*, p. 126.

### The goals of mathematical education

In the preface to *Mathematik des Wolf* and *Mathesis Wolfiana*, Nagel emphasized what he saw as the central pedagogical value of mathematics in Wolff's system: its capacity to cultivate rigorous and orderly thinking across all disciplines. Mathematics not only supports technical activities such as surveying and mapmaking, but also trains the mind to seek thorough understanding and provides a model of reasoning in principle applicable to different academic fields such as law, theology, and medicine. By fostering clear and adequate concepts, precise judgements, and strong arguments, mathematics 'sharpens the mind'<sup>50</sup>.

Such training, Wolff maintained, requires that mathematical reasoning be reduced to chains of syllogisms, which best reveal the inferential structure inherent in the 'natural way of thinking'<sup>51</sup>. His thesis on the logical-syllogistic nature of human reasoning underpinned his repeated claim that mathematics must precede all other studies, even logic itself, because it acquaints students early on with the clarity of concepts and validity of proofs<sup>52</sup>.

For mathematics to fulfill this role, Wolff cautioned against learning through rote memorization based on the authority of the teacher or textbook, as such practice would undermine the mind-sharpening value of mathematics<sup>53</sup>.

Although he conceded that unrigorous, or 'mechanical' methods based on intuition and visualization could help foster insight and achieve understanding, Wolff maintained that mathematics could truly serve as a foundation for orderly thought only if it were learned in a way that enlightened the logical interconnections between truths. Wolff's pedagogical model, although adapted in later versions, was first outlined in the introductory chapters of *Anfangsgründe* and *Elementa*. At the heart of this model is an axiomatic system modeled after Euclid's *Elements* and structured through definitions, axioms, postulates, and propositions logically derived from them. This formal structure had didactic relevance; it guided students to reason deductively via syllogisms, mirroring the inferential clarity of mathematics. In this Euclidean spirit, Wolff affirms that mathematicians follow the correct method when they 'begin with defini-

<sup>50</sup> See C. Wolff, J.A. Nagel (transl.), *Mathematik des Freyherrn Christian von Wolf*, p. IV–V. See also D. Crippa, *Teaching Elementary Mathematics at the University of Prague*, p. 122.

<sup>51</sup> Wolff's idea about mathematics as a 'natural way of thinking' ('natürliche Art von Denken') is discussed, for instance, in H. Kuhn, *Die Mathematik im deutschen Hochschulwesen*, p. 56. On mathematics as a paradigm for logical thinking, see M. Favaretti Camposampiero, *Wolff and the Logic of the Human Mind*, [in:] *The Force of an Idea*, ed. by S. De Freitas Araujo, T. Constâncio Ribeiro Pereira, and T. Sturm, Springer, Cham 2021, p. 124–125. On the origins of this view, see T. Frangsmyr, *Christian Wolff's Mathematical Method and Its Impact on the Eighteenth Century*, p. 656–657.

<sup>52</sup> See C. Wolff, *Auszug aus den Anfangsgründen aller mathematischen Wissenschaften*, Halle 1717, *Vorrede*, p. 4.

<sup>53</sup> See *Ibidem*, p. 5. See also Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 278–279.

tions [...] whence they go to axioms and postulates [and] upon these, they build theorems and problems'<sup>54</sup>.

Similar to Euclid's *Elements*, the starting point of this ordered structure is definitions ('Erklärungen' in German). Definitions are more than descriptions or explanations of concepts; they play a key part in the derivation of theorems and problems. Wolff's method must pay particular attention to the criteria for determining *good* definitions, such as being 'clear and distinct' ('klar', 'deutlich'), i.e. they list the key features of the concept or notion defined, and 'complete' ('ausführlich'), i.e. their marks or features are sufficient to be able to always apply the concept<sup>55</sup>.

After definitions, Wolff included another type of judgment, namely principles ('Grundsätzen'). Principles form an overarching category, under which axioms and postulates fall. This distinction follows only in part Euclid's distinction between 'common notions' and 'postulates'. In Euclid's *Elements*, the former concerns the general properties of magnitudes, whereas the latter states the possibility of geometrical constructions.

Wolff, however, classifies axioms and postulates as principles on an epistemic basis: a proposition counts as a principle if it can be immediately inferred from a definition without an intermediate chain of reasoning. Within this framework, postulates express that 'something can be done', while axioms state that 'something is'<sup>56</sup>. He thus treats Euclid's common notions as axioms, but also assigns axiomatic status to propositions such as 'all radii of a circle are equal', since it follows directly from the definition of a circle as the locus of points equidistant from a given point. Likewise, Euclid's first postulate that 'a straight line may be drawn from any one point to any other point' becomes, for Wolff, an immediate consequence of the definition of a straight line as a 'length without breadth, terminated by points', and therefore a principle as well.

The Viennese Compendia also drew on these philosophical ideas as a foundation for teaching mathematics. The preface of *Mathematik des Wolf* emphasizes

<sup>54</sup> C. Wolff, *Elementa Matheseos*, Halle 1713–1715, vol. 1, p. 3.

<sup>55</sup> On Wolff's doctrine of definitions, see P. Cantù, *Mathematics. Systematical Concepts*, [in:] *Handbuch Christian Wolff*, ed. by R. Theis, A. Aichele, Springer, Wiesbaden 2018, p. 357–380, 374–375. In his detailed account of his own writings, published in German (*Ausführliche Nachricht von seinen eigenen Schriften, die er in deutscher Sprache herausgegeben*, 1726), Wolff remarked that one of the central tenets of learning mathematics is to define 'all words used to denote things [...] by clear and complete concepts' (S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 276). On 'complete' concepts, see G. Gava, *Conceptual Analysis and the Analytic Method in Kant's Prize Essay*, "Hopos: The Journal of the International Society for the History of Philosophy of Science" 2024, vol. 14, no. 1, §2.

<sup>56</sup> See C. Wolff, *Der Anfangsgründe aller mathematischen Wissenschaften*, Halle, 1710, §28, p. 14: 'Diese Grundsätze zeigen entweder/daß etwas sey/ oder daß etwas könne gethan werden'. In the *Elementa matheseos*, an axiom is a judgement that 'predicates what holds, or does not hold, of a certain thing' and a postulate a judgement that 'affirms or denies whether something can be done' (C. Wolff, *Elementa matheseos*, Halle 1713–1715, vol. 1, §30, p. 9).

the importance of practicing rigorous gap-free proofs, even for the simplest geometric propositions. To exemplify this point, the editor, Nagel himself, provides a few examples of theorems proven rigorously, that is, via a chain of syllogisms. One example is the following: 'In a circle, the angle at the center is twice the angle at the circumference'<sup>57</sup>. Drawing from Wolff's explanations in Book V of the second Latin edition of *Elementa* (1741)<sup>58</sup>, Nagel recommends distinguishing the hypothesis (*Bedingungen*) and auxiliary constructions (*Vorbereitungen*) of the theorem at stake from the thesis to be proven (*Aussage*) and presenting them in a specific graphical outline, as shown in Fig. 4.

While it is unnecessary to delve into the specifics of Nagel's rather convoluted proof of this theorem, it is important to emphasize his overarching strategy, which summarizes Wolff's recommendations: one must examine the figure constructed from the hypothesis and auxiliary constructions, recall the definitions of the concepts entering the statement of the theorem, and derive immediate consequences ('unmittelbar Folgerungen'), or *principles*, from them. These consequences should then be linked to established propositions through syllogisms, ultimately leading to the desired theorem.

A notable pedagogical drawback of rigorous proofs crafted in this manner is that they can transform straightforward tasks, such as proving the theorem on the angles in a circle, into arduous endeavors. Consequently, neither Wolff's *Elementa* nor the compendia derived from it fully offer each chain of syllogisms for every theorem or problem. Instead, proofs generally provide a schematic framework that allows readers to reconstruct rigorous gap-free arguments. Teachers and students were presumably expected to be familiar with these frameworks to construct complete proofs and thus learn the practice of rigorous proofs<sup>59</sup>. This expectation may not always have been realized due to the complexity and length of syllogistic chains,

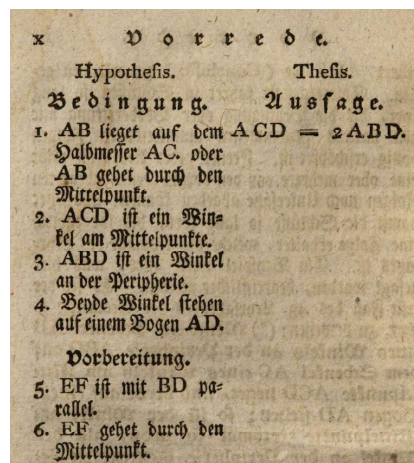


Fig. 4. Solving a problem according to Wolff's method.

Source: *Mathematik des Wolf*, p. x, <https://data.onb.ac.at/rep/1037B7E1> [accessed 20.01.2026].

<sup>57</sup> This proposition, drawn from Euclid's *Elements* (III.20), appears in Wolff's *Anfangsgründe* and Latin *Elementa Matheseos Universae*. Nagel's compendium adopts a version of the proof found in *Elementa*.

<sup>58</sup> See D. Crippa, *Christian Wolff's Elementa*, p. 101.

<sup>59</sup> From Wolff's own remarks, it also seems that in his lectures he showed how to apply the laws of the method to different areas of mathematics (S. Sommerhoff-Benner, *Christian Wolff als Mathematiker und Universitätslehrer des 18. Jahrhunderts*, p. 278).

although training readers and students in the application of syllogistic reasoning to mathematical proofs is an important part of mathematics teaching.

## Conclusion

The circulation of Wolff's *Elements* and its compendia influenced mathematics teaching and its conceptual role in central European universities. By examining these compendia, rather than just Wolff's major works, this paper identifies how his pedagogical principles entered higher education and describes their associated teaching practices.

Although Wolff's works circulated earlier in Habsburg lands<sup>60</sup>, his philosophy gained formal institutional support in universities only after the abolition of the Jesuit Order. Subsequently, Wolffianism was integrated into the curricula, along with the belief that mathematics's primary aim was to 'form' the mind<sup>61</sup>.

This ideal was not new<sup>62</sup>, but the use of Wolff's compendia in the classroom made it central to the Habsburg empire. By documenting how compendia were adapted and taught, this paper shows that the Wolffian ideal of mathematics to train the mind displaced other views of mathematics, chiefly as a practical art of measurement and problem-solving. This tension between the two views on the usefulness of mathematics is evident in Nagel's preface and in the writings of contemporary teachers, such as former Jesuit and mathematics professor S. Vydra, who stated that equating geometry with surveying and geometers with surveyors was insulting<sup>63</sup>.

In contrast to this elitist position, the dichotomy between geometry and measuring art is not as clear-cut even in Wolff's own treatment of geometry, where he freely mixed praxis with theory<sup>64</sup>.

Vydra's distinction can be better understood within the socio-political and pedagogical context of the Habsburg lands of the second half of the 18th c. Mathematics was taught in philosophical faculties, primarily to students who

<sup>60</sup> See G. Schuppener, *Mathematicians and Mathematics at Prague University during the Second Half of the 18th Century*, "Teorie Vědy / Theory of Science" 2021, vol. 43, no. 1, p. 105.

<sup>61</sup> On the importance of Wolff in the Habsburg reforms see I. Cerman, R. Krueger, and S. Reynolds, *The Enlightenment in Bohemia: Religion, Morality and Multiculturalism*, Voltaire foundation, Oxford 2011, p. 64.

<sup>62</sup> See H. Kuhn, *Die Mathematik im Hochschulwesen*, p. 47–52.

<sup>63</sup> See S. Vydra, *Gegenstände öffentlichen Prüfung, welcher sich in Gegenwart der ganzen philosophischen Fakultät aus den mathematischen Vorlesungen des Stanislaus Vydra k. k. ordentlichen Professors an der Universität zu Prag im Jahre 1797*, Prague 1797.

<sup>64</sup> T. Reimers, *Traces of the Impact of the Works of the Wittenbergian Mathematician Johann Friedrich Weidler on Textbooks and Academic Teaching of the 18th Century*, in "Dig Where You Stand" 7. *Proceedings of the Seventh International Conference on the History of Mathematics Education. September 19–23, 2022, Mainz, Germany*, ed. by K. Bjarnadóttir, F. Furinghetti, A. Karp, J. Prytz, G. Schubring, Y. Weiss, J. Zender, WTM Verlag, Münster 2023, p. 231.

would later enter vocational faculties such as theology, law, or medicine. Consequently, its pedagogical value as a tool to cultivate reasoning skills has become paramount, and this emphasis grew even stronger after the mid-18th c., as mathematics education expanded to include students in normal, military, and engineering schools. In these institutions, mathematics has a different social significance. For example, a textbook for lower rural schools, created after a General School Ordinance from 1774<sup>65</sup>, recommended avoiding fully fledged syllogistic proofs in favor of a more practical approach that used ‘mechanical proofs’<sup>66</sup>. This method, inspired by Wolff, represents an initial step toward familiarizing students with rigorous proofs. By using instruments to intuitively demonstrate the truth of a theorem (e.g., confirming that the sum of a triangle’s interior angles equals  $180^\circ$  by manipulating a protractor), students developed an early cognitive grasp of mathematical reasoning. In the Habsburg educational system, this graduated approach to proving became the responsibility of different institutions. Lower institutions focused on teaching mechanical proofs, while higher institutions emphasized more rigorous and ultimately elitist methods of proving suitable for advanced education. This twofold pedagogy corresponded to a twofold social function of mathematical proofs and, eventually, of mathematics: to provide a set of skills to solve practical problems on the one hand, and to provide propaedeutics for logical reasoning to prepare students for higher, vocational faculties.

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<sup>65</sup> See I. Jaklin, *Das österreichische Schulbuch im 18. Jahrhundert: aus dem Wiener Verlag Trattner und dem Schulbuchverlag*, p. 64.

<sup>66</sup> See *Anleitung Zur Meßkunst Zum Gebrauche Der Deutschen Schulen in Den Kaiserl. Königl. Staaten*, Deutsche Schulanstalt bey St. Anna, Wien 1776. In the preface, it is explicitly recommended that ‘mechanical proofs’ are sufficient for those who need to learn mathematics to become civil servants, such as stonemasons, gardeners, and carpenters.

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