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Idealistic Mathematics Education: The Institute for the Development of Mathematics Education (IOWO) and Dutch Education Reform, 1970–1980

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ABSTRACT

In the 1960s and 1970s Cold War context, education in Western countries was reformed aiming to educate democratic citizens. This paper shows that 1970s mathematics education reform in the Netherlands was driven by three ideals: democratisation, holism and science with society. The lack of national policy governing curriculum development in the early 1970s allowed the Institute for the Development of Mathematics Education (IOWO) to work according to these ideals, establishing it firmly in a national and international network. When Dutch government did implement centralised policies and reformed the education support system, it left no room for IOWO. However, IOWO's position and influence was leveraged so that part of its staff was allowed to continue as a research group. The new policy context did affect their ability continue their idealistic practices. Nevertheless, the research group, eventually renamed *Freudenthal Institute*, continued to have a lasting influence in Dutch and international mathematics education.

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Introduction

In 1979, the Dutch Minister of Education received hundreds of letters from mathematics teachers, teacher educators and academics, urging him to reconsider his decision to close down the Institute for the Development of Mathematics Education (*Instituut voor de Ontwikkeling van Wiskunde Onderwijs*, IOWO). The writers of these letters included many people of note. Cambridge psychologist Alan Bishop wrote: "[the institute's] initials have become a name which is synonymous with the ideals of quality curriculum development in mathematics. [...] It would be such a tragedy if this institute ceases to function in the way it has been able to till now."[1] Professor of mathematics education Thomas C. O'Brien from Southern Illinois University agreed: "[a]nything other than the thoroughgoing encouraging and strengthening of IOWO would be – there are no other words – an international tragedy."[2] IOWO had been founded only eight years prior to this and clearly was widely appreciated.

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The letters did not help: IOWO was terminated in 1980 because it did not fit within the recently reformed educational structure of the Netherlands. Dutch education had experienced major changes in the preceding decades. The 1960s saw a complete reorganisation of secondary education and, in the 1970s, the education support structure was centralised. This new centralised structure was organised into separate areas of curriculum development, teacher education, research, etc. As a consequence, there was no more room for an institute for mathematics education working on all those different categories. Despite the closure of the institute, however, the work and legacy of IOWO continued. The ideas and materials developed at the institute were at the basis of far-reaching changes to the Dutch mathematics curricula at both primary and secondary level. Furthermore, there remains to this day an institute at Utrecht University that bears the name of IOWO's first scientific director, Hans Freudenthal.

There are two aspects to this story that need explanation. Why did the Department of Education close down a successful and renowned institute? And how did the institute manage to have continued influence and success? These questions can be answered by investigating the institute's practices and how these were informed by the staff's ideals of democratisation, holism and science with society. IOWO exemplified idealistic currents in both education and academia, and I argue that the specific interpretation and execution of its ideals were the reason for the institute's closure as well as for the fact that the research group established in its wake could continue to build on IOWO's work and reputation.

IOWO fitted within an international trend. In the United States, the Netherlands and other parts of Europe, many initiatives were taken to modernise the mathematics curriculum.[3] After the Second World War, many countries and international organisations, such as the Organisation for Economic Co-operation and Development (OECD) and UNESCO, saw education as an instrument for rebuilding society.[4] Moreover, as Wim de Jong has argued for the Dutch case, with the war still in recent memory, education was considered as a means to foster democratic ideals and the capacity to think critically among future citizens.[5]

Christopher Phillips has shown that mathematics was seen as particularly suited for democratic education. Through mathematics education, students learned to think abstractly and solve problems: "Math is a discipline that disciplines."[6] This link between mathematics and reasoning skills is still assumed to exist today,[7] and debates about mathematics education are often closely connected to debates about how to teach children to think.[8]

In the United States, several smaller reform activities had been underway in the first half of the twentieth century. Then, the Soviet launch of Sputnik 1 in 1957 ignited a fear in the US government of falling behind in terms of science and technology. In this context, reform-oriented teachers and mathematicians were able to convince the federal government to fund a national curriculum project: New Maths.[9] Phillips has convincingly argued that, apart from the desire to bring mathematics education closer to "real" mathematics, this reform was underpinned by democratic ideas. In the United States, New Maths was part of an effort to raise critical citizens, resilient against communism.[10]

The post-war mathematics reforms in the United States and Europe have had a lasting influence. Despite some strong criticism, many of the core principles of these reforms, as well as newly introduced subjects such as statistics, live on. Especially the focus on the

individual and stimulating creativity, which are still at the core of many curricula today, have their origins in the post-war reforms. In the Netherlands, the current mathematics curriculum has its basis in the work of IOWO. To understand how IOWO became so influential, it is necessary to look beyond the content of the institute's work and assess the social and political context in which its ideas and materials circulated.[11]

The history of IOWO has usually been told with a focus on the content of the developments in mathematics education to which the institute contributed. In an insightful chapter in a recent volume on post-war mathematics reforms, Danny Beckers argues that the work of IOWO can be seen as the Dutch version of New Maths.[12] In her biography of Hans Freudenthal, Sacha La Bastide-Van Gemert thoroughly analysed the development of Freudenthal's ideas about pedagogy, but did not relate these to political and societal developments.[13] In this paper, I broaden the view by looking at the institute in its political context. In order to understand both the closure and the success of the institute, we need to understand its position in the wider Dutch education system.

Beckers has shown that the post-war mathematics reform efforts were driven by ideals, as illustrated, for instance, by the collective nature of IOWO's work – most publications were anonymous or signed by the "IOWO-team" – and by the idea that mathematicians were best suited to do this work, rather than psychologists or pedagogues. He touches only briefly on the ideals that drove IOWO, and does not go into the interplay of these ideals with policy or society. I expand Beckers's analysis by identifying the three main ideals that ran through IOWO's work, and by arguing that their implementation eventually clashed with policy reforms in the 1970s. The three most important ideals IOWO staff and their collaborators shared can be summarised as democratisation, holism and science with society.

These ideals pertained both to the content of mathematics education and to the practices of the institute. The staff's modus operandi was democratic in the sense that all participants had an equal say – that was the intention at least. The mathematics was democratic in that the starting point was the pupil, instead of axioms of mathematics. (Re)invention by the pupil was the basis of the pedagogy, and thus the teacher's role became less authoritative. The ideal of holism was expressed in the way IOWO integrated all aspects of educational development, e.g. materials, testing and pedagogy. In the mathematical content, this ideal was reflected by the aim to integrate mathematics with other subjects, such as physics and geography, and with everyday life. Third, the science with society ideal – I purposefully use "with" here rather than "for" – was the main precondition the IOWO staff set for all their work. IOWO staff, a mix of former teachers, researchers and developers, worked *together with teachers and schools*, not just in service of them. The most important goal of their work was that it should be useful in educational practice and that the development process should start and end in the classroom. In other words, the success or value of the institute's work was also to be measured in the classroom. In the education materials developed by IOWO, this ideal is reflected by the way mathematics was presented to pupils: in recognisable contexts, either imagined or taken from daily life.

In what follows, I outline the early history of IOWO, to then illustrate how the 1970s ideals of democratisation, holistic work and science with society informed the institute's practices. I show how these practices helped build strong relationships

within the educational field, positioning IOWO in a central place in mathematics education, both nationally and internationally. After demonstrating how educational policy developments in the mid-1970s affected IOWO's future, I argue that the staff's defence, using arguments based on their ideals, eventually worked against them. However, by calling on their network, the institute managed to retain some infrastructural continuity, and this, combined with their standing in the educational field, resulted in the establishment of a research group which could continue part of IOWO's work.

1950s and 1960s: A Time of Reform

In the 1960s the Dutch secondary education system was reorganised significantly. In the context of setting up the welfare state, this reform was meant to make the education system more democratic, in a meritocratic sense: providing equal opportunities for children from lower socio-economic backgrounds.[14] In 1960, there were three main secondary school types in the Netherlands, which had not changed since their establishment in 1857. These were the (M)ULO, HBS and Gymnasium, broadly aimed at the lower, middle and upper classes, respectively.[15]

Education reform was complicated in the Netherlands. Several Ministers of Education had tried and failed to reform the system between 1919 and 1963.[16] This was, in large part, due to the pillarisation of Dutch society since the early 1920s.[17] In 1917, a four decades long "school struggle" was pacified by the inclusion of "freedom of education" in the Dutch constitution, to the effect that both public schools and schools of any denomination would receive the same state funding, provided there was a large enough group of people supporting the school. Thus, all religious and secular pillars were enabled to set up schools according to their own convictions.[18] The support structure surrounding the schools, such as teacher support and curriculum development, was arranged according to those same pillars.

The reform act of the 1960s, targeting the class-based school system, was finally brought into effect in 1968, after over a decade of debate and adaptations. The law became known as the "Mammoth act" because of the magnitude of the reforms.[19] Its main purpose was the reorganisation of the secondary school system, from the social class based system to a more meritocratic one, with three main school types: MAVO (four years), HAVO (five years) and VWO (six years).

Each new and modernised school type required a new and modernised curriculum. Due to the freedom of education act, schools had leeway to shape their education the way they preferred. There was no formal body that governed, or developed, curricula. In 1961, separate from this reform, a committee had been established to modernise the mathematics curriculum and, after the passing of the Mammoth act, the Department of Education set up similar committees for the other subjects.

The Committee for Modernising the Mathematics Curriculum (*Commissie Modernisering Leerplan Wiskunde*, CMLW) was established in 1961 with the assignment to develop modernised mathematics curricula for the new secondary school system.[20] In *Theory and Practice*, Harm Jan Smid describes the creation of the CMLW as a "power grab" by the mathematicians, to the detriment of the influence of the professionals, the teachers.[21] This retrospective description does not capture the

intentions of CMLW and IOWO, and, moreover, imposes distinct categories of "expert" and "professional" on a situation in which these were not yet strictly separate.

Members of CMLW wrote textbooks, tested these, and discussed the results. Curriculum plans were written, based on these books, and the committee organised in-service courses for teachers to familiarise themselves with the material.[22] However, in what would become a recurring theme in its history, the committee would continue to expand on the scope of its assignment.

In 1967, a project, originating in Groningen, was brought to CMLW by Edu Wijdeveld, a teacher trainer in Groningen involved with the committee.[23] This project concerned the development of mathematics for primary education and was called Wiskobas (Wiskunde op de basisschool). By incorporating the Wiskobas project in its portfolio, CMLW now addressed both primary and secondary education.

Due to these expanding activities, accompanied by a significant increase in the committee's budget, the idea took hold within the committee that some of its work should be housed and financed in a more permanent way. As early as 1964, CMLW expressed the need for a permanent institute in a report to the State Secretary.[24] In 1967, the Department of Education denied the request, because it "want[ed] to wait and see the national developments in this field."[25] This indicates government wanted to wait for a centralised system, instead of making the ad hoc measures it had put in place in the 1960s permanent. CMLW kept filing requests with the Department, without success. Eventually, after yet another failed attempt, the committee-members working on the Wiskobas project decided to go on strike. They argued that their work had become overwhelming for CMLW, and that indispensable material facilities were lacking.[26]

This strike was publicised by CMLW in a report called "Wiskobasta," in which they lamented the future of Dutch mathematics education were their project to be discontinued.[27] This led to some attention in (regional) newspapers and to questions in parliament.[28] Later IOWO staff claimed the strike, together with the diplomacy of professor Hans Freudenthal, chair of CMLW, had convinced the Minister of the necessity of a permanent institute. Beckers nuances this claim. He argues that it is more likely that the government wanted to appease the mathematicians, to keep them close for future cooperation by giving them a temporary institute.[29] Whatever the reason for the change of mind at the Department of Education, the institute was granted. In 1971, IOWO was founded as an independent department of the Rijksuniversiteit Utrecht (RU, now Utrecht University), with Freudenthal as its scientific director. The institute was tasked with, among other things, developing a "model curriculum" for primary mathematics education.

Establishing IOWO Through Idealistic Practices

As Beckers has illustrated, post-war mathematics reform in the Netherlands was shaped by ideas that went beyond the subject of mathematics per se. For IOWO, I have identified three such ideals based on the institute's writings and practices: democratisation, holism, and science with society. These terms were not explicitly used by IOWO's staff. They are, I argue, the most basic and shared principles recognisable in the institute's publications and archival material.

All three ideals affected both IOWO's methods and its ideas about education. Democratisation was expressed in the involvement of all stakeholders in the process of developing teaching materials. IOWO publications were almost always anonymous, signed by "IOWO Team." Another example is how all participants in mathematics education – teachers, pupils, parents – were included in the institute's work. In the mathematics education pursued by IOWO staff, the democratic ideal centred on individual learning processes and on fostering understanding.

The second ideal, holism, is visible in the institute's interpretation of the assignment of curriculum development. In the Netherlands, centrally defined curricula were generally very basic, because of the freedom of education act, mostly restricted to a list of topics to be taught. IOWO staff, however, shared the opinion that the development of mathematics education should integrate all aspects of this education: developing learning theories, designing materials, creating testing practices, etc. This holistic thinking was also applied to the contents of mathematics education. Ideally, mathematics would be integrated with other subjects.[30] IOWO produced several lesson series to exemplify what this would look like, such as "around the world in eighty days," a lesson series combining geography and mathematics.[31]

Lastly, the ideal of science with society can be found in the institute's conviction that *useful* work for education had to start in the classroom, not from theory. Theory and research could help to give direction, but one had to start with defining goals and norms, situated in practice.[32] Moreover, the end goal of the research and development work was in the classroom as well. The quality of the work was to be judged by its success in the classroom, not by any measure of scientific rigour.[33] And again, in the mathematics IOWO developed, this ideal was expressed by the focus on useful mathematics, on what pupils would need, even if they would not continue to study mathematics.

IOWO was divided into two main groups: Wiskobas, aimed at primary education, and Wiskivon, a collection of projects concerning secondary education. For the purposes of this paper, I focus mainly on the Wiskobas group, for two reasons. Firstly, it presents a more concise and straightforward case. In contrast to the Wiskivon group, the Wiskobas group focused on a single goal, with two sub-projects: developing a curriculum for primary schools and developing teacher education to match this new curriculum. The Wiskivon group had smaller projects for all types of schooling in Dutch secondary education.

Secondly, and more importantly, the work of the Wiskobas group was very successful and it was at the basis of the institute's long lasting legacy. The curriculum developed by the group, including the pedagogical ideas, was adopted in most Dutch schools over the course of the 1980s and 1990s, under the name "realistic mathematics" (*realistisch rekenen*).[34] More recently, this curriculum and its pedagogy have become heavily contested in public debate, so a deeper dive into its origins is desirable.[35]

The Wiskobas project centred on two related areas: developing and testing a model curriculum for primary schools, and preparing teachers for this new curriculum, through in-service training and developing a new curriculum for teacher colleges. For this work, the institute worked together with a primary school and a teacher college, which they referred to as "design schools" (*ontwerpscholen*).[36] The Wiskobas team worked closely together with the teachers of these schools, to test the lesson materials designed at IOWO. The materials, "lesson packages," for primary schools were designed by the team, and

then brought to the classrooms in the design school, the Dr. Willem Dreesschool. Wiskobas staff were often present during these lessons, to observe how the children reacted. Afterwards the experience would be discussed by the staff together with the teachers. Based on the observations and insights from both IOWO staff and teachers, the material would be revised and tested again.[37] After a few years of this iterative process, a model curriculum for primary schools took shape.

The shared principles of IOWO, on which the designed lesson material was based, were developed during weekly meetings. Both groups, Wiskobas and Wiskivon, met separately twice a week, and on Fridays they would have a collective meeting, followed by drinks.[38] The goal was to develop a collective (theoretical) framework.[39] Topics of discussion included articles on child psychology, insightful mathematics problems, and questions relating to the nature of geometry education.[40] According to a staff member, the collective meetings were especially aimed at fostering a more abstract, theoretical basis for the mathematics education under design.[41]

The weekly meetings were referred to as "internal cadre formation." The institute's annual reports also mention "external cadre formation." The Dutch word for cadre, *kader*, can be translated both as framework and as cadre, in the sense of a group of people that give direction to those "below" them. Internal cadre formation, then, referred to cadre in the sense of (theoretical) framework, while external cadre formation meant the creation of a cadre of people, working in education.[42] This was done through conferences, for instance, and through a collaboration with teacher trainers. In a way, the external cadre formation was an expression of the ideals of science with society and democratisation: the cadre was encouraged to contribute to the institute's work. However, the use of the word "cadre" also points to a top down implementation; the cadre of teachers and especially teacher trainers, would in their turn show the way to new teachers, circulating IOWO mathematics to those not in contact or collaboration with the institute.

IOWO's aims were summarised in an information bulletin published in 1972:

> To pursue a humane mathematics education in an appropriate position in the total curriculum, according to a democratic curriculum procedure and in simultaneous development with cadre formation, training and support.[43]

In that same year, the annual report expanded on this description. Humane mathematics education entailed an emphasis on "mathematics as a human activity."[44] This meant that actions and human thinking processes were central to the curriculum, instead of mathematical axioms and definitions. The "democratic curriculum procedure" referred to a process in which, ideally, all stakeholders were included in the development of a new curriculum. Teachers, pupils, teacher educators, educational advisors; everyone involved in implementing and executing the curriculum was considered an important collaborator.[45] In practice, however, the role of these stakeholders did not always extend beyond participant or sounding board.

The bulletin also provided insight into what IOWO (and CMLW) understood a (model) curriculum to be, which was much broader than what the government expected from them. The bulletin stated that a curriculum was more than a list of subject matters and an overview of when to teach these. Instead, they aimed for a kind of roadmap, which would contain "subject material, lesson materials and learning formats,

complemented by goals and testing norms and materials."[46] This roadmap was then to be used by teachers as inspiration, on the basis of which they would design their own education, choosing their own path to the goals, which were fixed.

From this description of the philosophy (humane mathematics), process (democratic procedures) and product (an all-encompassing model curriculum), it is clear that IOWO carved out a significantly larger project for itself than the Department of Education had in mind. However, because the plans for centralising education support were still in development, the institute could do as it pleased in the early 1970s.

The institute's ideals fitted within a wider trend of progressive education reform, both nationally and internationally. In post-war Dutch society, the purpose of education was reshaped. Instead of directing personal development with clear instructions from an authoritative teacher, the emphasis was on the freedom of the individual and educating critical thinkers. Through this process, it was thought, such critical thinkers would develop their own morals and become democratic citizens.[47]

Instances of the ideals of democratisation and the holistic approach of curriculum reform were also present in international educational contexts. At a conference of the International Commission on Mathematical Instruction (ICMI) in 1976, a panel discussion concerned the analysis of the process of curriculum development. The participants in this panel agreed on the importance of involving teachers in the process and on the premise that the relation between mathematics and society should be taken into account when designing a curriculum – mathematics education was not just for future mathematicians.[48] In another panel a development in research practices towards more "open" and "descriptive" methods was identified, due to the realisation (among mathematics curriculum reformers) that traditional education research often lacked relevance for educational practice.[49]

IOWO's Wiskobas project was an example of a project which involved teachers at all stages, where the development of goals, designing materials and in-service teacher education were integrated, and where descriptive and open research methods were used: classroom observation, conversations with students and teachers were often the starting point, not a hypothesis or experiment. As indicated, the Wiskobas project included a collaboration with the Dr. W. Dreesschool. The school functioned specifically "to enable a very close cooperation between curriculum developers, teachers and children." This close cooperation would benefit the search for an "optimal curriculum."[50] The teachers were invited to reflect on what they had experienced and how the material functioned in class. The teachers were seen as important contributors to the development of the new curriculum.[51]

Through this strategy to integrate teachers in the Wiskobas project, only a small group of teachers could be reached. IOWO wanted all mathematics teachers to get involved, however, and used several communication channels to do so. In publications, courses and conferences, IOWO explicitly sought to not merely disseminate their findings to teachers but also to involve them. IOWO published two periodicals: *Wiskobas Bulletin* and later, starting in 1975, *Wiskrant* (*Maths Newspaper*). In these publications project updates were shared, as well as lesson material as it was developed. Teachers were urged to contribute and encouraged to send in their own writings, such as responses to articles written by IOWO, or descriptions of experiences with material produced by the

institute.[52] Hence, IOWO aimed to make these publications spaces of interaction. They do not seem to have been very successful in getting teachers to contribute to these publications, however.[53]

The institute's practices resulted in active collaboration and communication with the mathematics education field in the Netherlands. Aside from the direct interaction with teachers in their projects, and the publication of their own periodicals, the institute was closely connected to the mathematics teachers association (NVvW), and organised conferences to showcase IOWO's work and to get input from teachers to guide future development.[54]

IOWO became an important actor in mathematics education very quickly. It soon established itself as a centre of expertise and was perceived as such not just by mathematics teachers, but also by the public and by politicians. A Friesian newspaper reported on the "tentative" introduction of mathematics (as opposed to arithmetic) in primary schools. Soon, it said, parents might not recognise their children's schoolwork anymore. According to the article, primary schools in the entire country were starting to introduce a new kind of mathematics, often in cooperation with IOWO. At this institute, the article stated, "a large number of experts were working on a good plan for mathematics at primary schools (Wiskobas)."[55]

Policy Developments: Drawing Borders Straight Through IOWO

As mentioned above, IOWO was set up in a time when the entire secondary education system had just been reformed, and the next reform was already in the works. The first reform, the Mammoth act, resulted in a great need for the services of the institute, while the next imposed limits on what IOWO could do. The field of education development in which the institute operated was not clearly delineated or governed yet, but this was about to change. The new Minister of Education, Jos van Kemenade (PvdA), wanted to structure the education support system. He recognised that education development required cooperation between many stakeholders and, to facilitate this, he thought specific tasks should be clearly demarcated.[56] Moreover, the size and impact of this work required national coordination.

This view of the necessity of central governance of education reform was in keeping with the contemporary view of the "socially engineered society."[57] In the 1960s and 1970s, Dutch policy makers and politicians shared a belief in the transformability of society, and in the government as the entity to bring about this change.[58] Education was seen as an important instrument in this process and Van Kemenade was convinced of the potential of education for enhancing social mobility.[59] Thus, Van Kemenade's plans were also underpinned by an ideal of democratisation, but one in which central governance took primacy over local collaboration.

As mentioned above, by 1975 there were dozens of groups advising the Department, and there were even more centres, institutes and advisory bodies working with schools and teachers. In a memo in 1975, the Department complained that there were "numerous activities" in the domain of education development, but coordination between them was lacking.[60] While organising the educational field so as to implement his plans for a comprehensive "middle school,"[61] Van Kemenade took the opportunity to reorganise the education support structure.

Van Kemenade, who took office in 1973, was a social democrat (PvdA, the Dutch Labour party) and was minister of education in a cabinet that became known as the most left-wing cabinet in Dutch history.[62] Parliamentary opposition was sceptical of Van Kemenade's plans to centralise education. To circumvent this opposition, the minister used a bottom-up strategy to gain support for his plans. He sent multiple memos to the educational field to collect opinions and develop the reform plans in cooperation with stakeholders.[63] This resulted in a "discussion memo" in 1975 that presented a comprehensive account of what the educational system and the education support structure should look like.[64]

For the purposes of this article the proposals for the reform of the support structure are most relevant, because IOWO fell into this category. In the "discussion memo," several strict boundaries were drawn between the different actors and activities involved in education. First of all, three separate groups of actors were distinguished. These groups were the educational field, support experts and government, each with their own roles and responsibilities.[65] The educational field was defined as those directly involved in the educational process, such as teachers and school leadership, as well as pupils and parents. Support experts were a completely separate group, consisting of those who, based on their expertise, could assist and advise the educational field. Within IOWO, this distinction was quite blurry. Many of the staff were (former) teachers and the teachers they collaborated with were not seen as people in need of advice, but rather as experts whose knowledge was essential for the project to succeed. Thus, the categories as defined by this memo were difficult to apply to IOWO's staff and collaborators.

Within the field of expert support, the memo made further distinctions between research, curriculum development, test development, and training. Again, this separation was in conflict with the ideology and methods of IOWO. The institute viewed the development of mathematics education as the result of the integration of all those activities. Furthermore, the memo listed CMLW as working on curriculum development. Yet, the Department's definition of curriculum development did not correspond to that of IOWO and CMLW. Wiskobas's model curriculum, for instance, included not just a list of subjects to be taught, but comprised pedagogical principles, examples of learning materials, and even descriptions of what a lesson would look like. Traditionally, Dutch curriculums had been rudimentary, because freedom of education was a highly held principle. Although ideas about curriculum development were changing among progressive thinkers in the 1970s, the Department still held a more limited view on what a curriculum should be than IOWO did.[66]

In Figure 1 IOWO is visualised by the first vertical column, restricting their work to the subject of mathematics, and spanning all areas of support. Contrastingly, the horizontal lines represent the way Van Kemenade wanted to organise education support: central institutes focused on one aspect of support, such as curriculum development, but spanning all school subjects.

In this way the government drew boundaries that ran right through IOWO. In the government's view, CMLW and by extension IOWO fitted neatly within the category of curriculum development (in the narrow sense). The Department of Education had found that the various activities in this category lacked national coordination. This was a problem, because it meant that there was overlap between different initiatives and, in some cases, a divide between educational practice and the developmental activities.[67] To

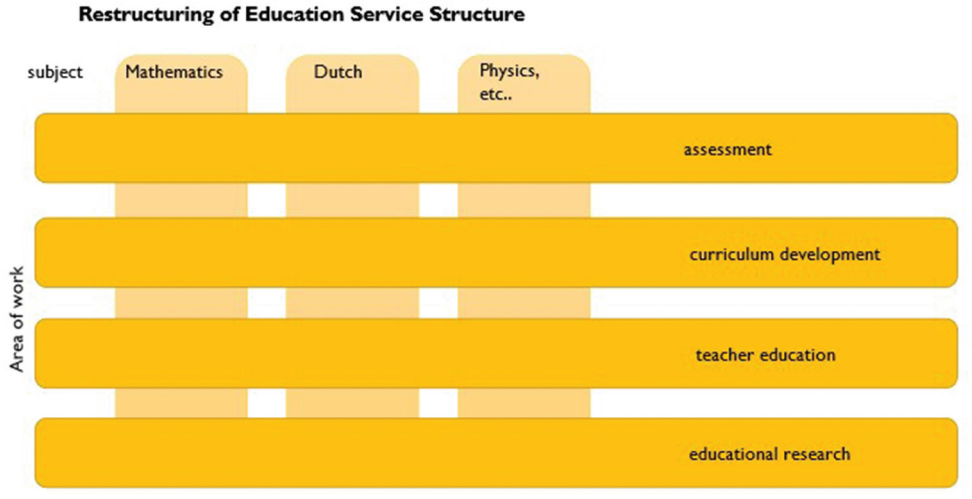

Figure 1. Schematic overview of the organisation of the educational field, according to the plans of minister Van Kemenade.

mitigate this problem, the Foundation for Curriculum Development (*Stichting Leerplan Ontwikkeling*, SLO) was set up on 10 January 1975.

SLO had a four-pronged task: developing models for curricula, advising educational organisations with respect to the elaboration and implementation of these models, advising the minister about issues related to curriculum development and, finally, the coordination of "other activities" related to curriculum development.[68] Despite this very broad task description, or perhaps because of it, the relationship between this new institution and existing bodies like CMLW and IOWO remained unclear. It was noted that the role or even existence of CMLW should be rethought in light of the newly established SLO.[69] On the other hand, it was also suggested that SLO could seek advice on certain issues from CMLW, suggesting a continued role for the committee.[70] Furthermore, in an example of how a developmental or innovation project might be structured, IOWO was mentioned multiple times as a possible actor in the process, and Wiskobas was cited as a good example of what could be done.[71] In the memo, CMLW and IOWO's position was not specified, but it was clear that they would have to relate to SLO in some way.

Defending IOWO

In light of the SLO plans crystallising in the mid-1970s, IOWO needed to convince the Department of Education of its continued utility next to this new institution. SLO would not incorporate teacher training and material development, as IOWO had, yet the IOWO staff believed there was still a niche for them to fill. In order to convince the Department of Education of the legitimacy of IOWO existing alongside SLO, the institute campaigned by emphasising the interconnected nature of their work, consisting of more than (narrow) curriculum development.

In the annual reports after 1975, two things stand out: research gained a more prominent place in the institute's self-described activities and the holistic nature of the institute's work was explicitly commented on. These reports were sent to the Department of Education, and served not just as a way of accounting for their activities, but also as a vehicle to advocate for the institute's existence and financial support.

In the reports from the mid-1970s, the goals of the institute were more explicitly stated than before and now covered a broader terrain than strictly curriculum development. In the planning for 1974–1975, for instance, "cadre formation" was claimed to be as important within the institute's work as curriculum development.[72] Prior to this, cadre formation had not been given such a high priority in the annual reports, and it likely was an attempt to make clear to the Department that IOWO was doing more than "just" curriculum development.

IOWO recurrently stressed the broad extent of their work in their communication with the Department in this period. Moreover, they emphasised that the various aspects of developing mathematics education were intertwined. The annual report for 1976 described the institute's work as consisting of three interrelated parts:

> Characteristic of IOWO's educational development strategy is the unseparated approach: work is carried out in all sectors on all components as far as necessary and possible. In IOWO's vision, one can distinguish three related components in educational development;
>
> - Curriculum development;
>
> - Change support;
>
> - Research.[73]

It is notable that the work of the institute as a whole is described as education development, of which curriculum development is just one part. As the developmental work on the curriculum progressed, the emphasis would shift towards the change support and research aspects, according to IOWO.

The addition of "research" in this list is striking. Previously, the institute had never claimed research was an important aspect of its work. Freudenthal had even claimed that

> IOWO is no research institute; its members do not regard themselves as researchers but as producers of instruction, as engineers in the educational field, curriculum developers. Engineering needs background research and can produce research as fall out.[74]

Freudenthal wrote this in the same year. 1976, as the annual report appeared that claimed research as one of the three core aspects of IOWO's work. How could these two statements be written so close together in time? The answer is twofold.

First, it is important to take the context of the quotes into consideration. Freudenthal's claim is in a preface of a special issue of *Educational Studies in Mathematics* (*ESM*), the journal he had established in the 1960s.[75] The issue celebrated IOWO's fifth anniversary. *ESM* was an academic research journal, its readership were international researchers. It is likely Freudenthal wished the readers of the journal to judge the content of the issue not on academic research standards, but as practical, developmental work, in line with the science with society ideal. In the case of the annual report, the readership was obviously different. In this context, the goal was to convince the Department of the differences

between SLO and IOWO, and to establish the legitimacy of IOWO as an independent institute next to SLO. There was more to it than just rhetoric, however.

While IOWO was trying to negotiate its continuation with the Department, the Wiskobas project was coming to the end of an important phase: the model curriculum was published in 1975.[76] This meant that a very important raison d'être for the institute fell away, plus Wiskobas staff now had time to focus on other things. The move to research was part of this process.[77]

In practice, IOWO's publication output did indeed increase. Before 1976, Freudenthal had been the only IOWO staff member who published in *ESM*. These were mostly articles about his philosophy of and ideas about mathematics education, which did not usually refer to specific work done at IOWO. After 1976, however, more members of IOWO wrote articles for *ESM* and Freudenthal's contributions focused more on IOWO's work.[78] Moreover, two IOWO staff members wrote a dissertation on their work in the Wiskobas project.[79]

IOWO's strategy to convince the Department of Education to continue to finance the institute consisted in emphasising the difference between SLO and IOWO, both in scope (e.g. inclusion of research) and methods (e.g. holistic practices). In doing so, however, the institute also inadvertently demonstrated that it did not fit into the newly designed landscape of educational support. In this new landscape, there were clearly delineated categories of research – teacher training, curriculum development and test development – all of which IOWO wished to continue to combine.

The End of IOWO

In 1976, it became clear the Department had decided that all curriculum development work would be transferred from IOWO to SLO. Even so, IOWO continued to try to save at least part of the institute. By 1979, the new State Secretary for education, Ad Hermes, had had enough of the stalling of IOWO and decided the process of transferring the developmental work from IOWO to SLO needed an impulse. Frustrated by the unwillingness of most IOWO staff members to transfer to SLO, in April 1979 Hermes sent a letter to the university's executive board, the official employer of IOWO staff, urging them to fire a number of staff. Thus, the only way for the staff to avoid unemployment was to transfer to SLO before August.[80]

This decision prompted IOWO to rally its network, in an attempt to convince Hermes of the disastrous consequences of closing IOWO. In a notice published in the journal of the mathematics teachers' association *Euclides*, IOWO staff stated that they would not yet give up and that they "felt morally obliged to Dutch education to continue IOWO's work."[81]

In the following months the letter campaign referred to in the introduction of this paper started. Thousands of teachers, teacher educators, researchers, mathematicians, etc., sent letters stating that closing down IOWO would be a great loss to mathematics education, both in the Netherlands and abroad.[82] It is interesting to see that these supporters copied the institute's dramatic language. Both the volume and the language of the letters indicate that, in its eight years, the institute had truly positioned itself at the centre of a network of mathematics education, both nationally and internationally.

The support against closure did not just come from mathematics educators, but from politicians as well. In the senate, Guus Zoutendijk, a VVD senator and former member of CMLW, held a long speech commemorating the excellence of IOWO, its international

reputation, and the positive impact it had had on Dutch mathematics education exactly because of its holistic approach. IOWO's work, he said, was especially remarkable, because it "paid balanced attention to the various aspects involved in educational innovation, such as research for development, designing of new curriculums and support in the necessary process of change, the latter leading in particular to reorientation and cadre formation in the field."[83] Clearly, and not necessarily surprisingly given his own history with CMLW, Zoutendijk supported the institute precisely because of its holistic practices.

The campaign resulted in a final extension for IOWO. On the condition of the transfer of curriculum development to SLO, Hermes granted the institute until August 1981 to wind down its activities and to propose plans for a research group.[84] Most IOWO staff still did not see this as an acceptable solution, and the transfer of projects and staff was not going swiftly.[85] Therefore, in January 1980, the State Secretary decided to fully dissolve IOWO in January 1981 – half a year earlier than previously agreed. Any member of staff who was willing to could still transfer to SLO.

There were several reasons why IOWO staff were so reluctant to comply with Hermes's conditions. Some of these were personal; IOWO was a small scale institute with a very cohesive social structure, while SLO would be a lot bigger. A very practical reason for some was that SLO was situated in Enschede, about one and a half hours by car from Utrecht, where IOWO was located. Transferring to Enschede, therefore, also meant moving house for most staff members.

Those who were thinking about transferring to SLO were met with distrust. One staff member, for instance, did not tell anyone he was considering transferring, until his position as vice president of SLO was confirmed. At a farewell party for him, a comic song was performed by the staff, in which he was compared to a wartime collaborator, though this was in good spirit, according to former staff members.[86]

The main reason for IOWO's opposition to splitting up its work between SLO and a new research group was substantive. It implied the definitive separation of what the staff saw as fully intertwined aspects of the developments of mathematics education: curriculum development, change support and research. IOWO's unhappiness with the proposed solution resulted in a proposal for a research group which upset State Secretary Hermes, again. The proposal included a staff of about two thirds of the size of IOWO. Hermes remembered Freudenthal himself saying in 1976 that IOWO mainly focused on curriculum development, so the research part of IOWO's work could do with a much smaller group, in his view.[87] Apparently the shift in emphasis towards research in the annual reports had not quite convinced Hermes. He told the parliamentary committee for science and education that he was under the impression that IOWO was aiming to continue its work as before, without transfer of any of its work to SLO or teacher training institutes.[88] He was probably right.

When Hermes finally decided IOWO would be closed in January 1981, he did allow for a "preparatory research group," consisting of five scientific and three administrative employees.[89] Its task would be to research the possibilities of establishing a permanent research group. Initially, this preparatory group would be funded by the Department of Education, until a permanent research group was established.[90] Soon after this, Utrecht University committed to the establishment of a permanent research group of the proposed size at the sub-faculty of mathematics.[91]

In the government's eyes this was a fair compromise. In their view it had been clear from about 1976 that all curriculum development activities would transfer to SLO, and all teacher training would transfer to the appropriate institutions. The fact that a small portion of IOWO could continue their research activities meant, according to the Department of Education, that the continuation of all of IOWO's work was ensured.

IOWO – and its supporters – took a different view. In response to Hermes's decision to dissolve the institute and set up a small research group, IOWO sent the State Secretary a telegram, which was also published in *Euclides*. They felt that they had still been in conversation with the Department about the future of IOWO's activities, and that the decision went against a promise made to "thousands of letter writers at home and abroad" that the continuation of IOWO's work was safeguarded.[92] IOWO announced they would continue to protest this "destructive policy, which completely ignored the interest of Dutch mathematics education."[93] In the next issue of *Euclides* the editorial board printed a short notice, calling on their readers to join them in protesting against the decision, because, by dividing IOWO's activities over three separate institutions, Hermes "removed the soul from IOWO's work."[94]

These protests were to no avail, and in January 1981 IOWO was dissolved. In its place a research group was established at Utrecht University, the Research group for Mathematics education and Education Computer Centre (OW&OC). IOWO commemorated its closure with the publication of *The Backside of the Möbius Strip*, a book heavy with symbolism. It was black, with white lettering and a white mourning band. The cover showed an image of a cut through Möbius strip (Figure 2).[95] The Möbius

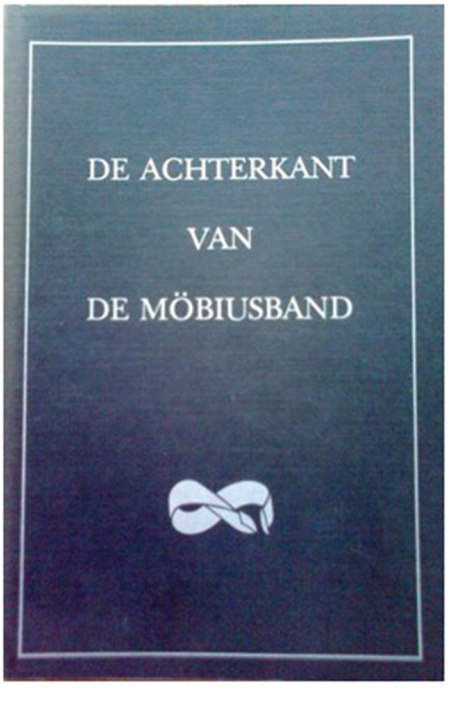

Figure 2. Front of the book *The Backside of the Möbius Strip* (1980). Published on the occasion of the closure of IOWO.

strip was the logo of IOWO. It is a mathematical figure that has no backside; if you start on one side, following the arch of the strip with your finger, you will eventually find yourself on the other side without ever having taken your finger off the strip. For IOWO, this symbol visualised the holistic nature of the development of mathematics education. Cutting through the Möbius strip created two sides, signalling the separation of IOWO's activities, and visualising the feelings of despair felt within IOWO in 1980.

The book conveyed the same message: IOWO was mourning its closure, and the end of their holistic work on mathematics education. Former IOWO director Fred van der Blij emphasised that the new research group was *not* a continuation of IOWO.[96] The integration of all types of activities and the close collaboration with schools and teachers had been integral to IOWO's identity, but this was no longer possible within the new research group.

Once this group, OW&OC, had been set up, however, it quickly picked up where IOWO had left off. Although Van der Blij had been adamant that OW&OC was not a continuation of IOWO in any way, it was regarded as such by many, if not most bystanders. In the press, for instance, OW&OC was commonly referred to as IOWO's successor.[97] This was not without reason, as OW&OC, though in a much smaller setting and with fewer resources, continued in a similar vein.

Its activities were more focused, necessitated by the decrease in personnel and resources, but at its core, OW&OC still consisted of people with the same ideals as in the decade before. Moreover, besides the continuation of ideals, OW&OC also continued to foster the expertise built up at IOWO. When the Department of Education wanted to start a project for the development of a new mathematics curriculum for the highest track in secondary education, it eventually turned to OW&OC to lead this project. Two employees of the research group, Martin Kindt and Jan de Lange, had been involved in the preparation of this project, and were judged to be the best candidates for the job.[98] Thus, a large scale curriculum development project was led by OW&OC, rather than SLO.

OW&OC built on the position IOWO had held in the Dutch mathematics educational system, yet there were some changes as well. There were fewer resources and fewer possibilities for close collaboration with teachers and schools. Furthermore, attention to research at OW&OC increased, compared to IOWO.[99]

Despite these significant changes in their practices, OW&OC soon even presented itself as the successor to IOWO. Significantly, in the 1980s and onwards, Dutch primary school mathematics was heavily influenced by the Wiskobas curriculum developed by IOWO in the 1970s. This curriculum, including its pedagogy, was introduced in textbooks as *Realistic Mathematics Education* (RME) in the early 1980s, and these books quickly gained more than half the market share of mathematics textbooks in the Netherlands.[100] In reports about this development, OW&OC was presented as the home of RME.[101] More recently, in the 2000s, public debate arose about the effectiveness of this curriculum and, again, the successor of OW&OC, the Freudenthal Institute, was seen, and presented itself, as the original developers of RME.[102] Clearly, after the dust of the closure of IOWO had settled, OW&OC continued much in the same spirit as before, albeit under different circumstances and with fewer staff and resources than before.

Conclusion

OW&OC, renamed the Freudenthal Institute in 1991, was in many ways a continuation of IOWO, but it also turned out to be quite different from its predecessor. The ideals of the late 1960s and early 1970s, of working in close collaboration with schools and teachers, addressing all aspects of education simultaneously, and tying practical impact to theoretical development, did not fit within the 1980s political and institutional reality in which OW&OC operated.

Expanding on Beckers's analysis, this paper has given more insight into the ideals that informed IOWO staff's practices. The three most important ideals I have identified were democratisation, holism and science with society. Working according to these ideals, IOWO managed to establish itself in a broad and influential mathematics education network in the 1970s.

This history of IOWO illustrates that Dutch mathematics education was not just influenced by political ideals but was also taken to be an instrument in the democratic process. The democratic ideal was manifest both in the contents of IOWO's work and in their approach to curriculum development. All stakeholders, and especially teachers, were involved, in some way, at each step. This required local organisation for local differentiation.

The latter form of democratisation of education clashed directly with the policy reform of minister Van Kemenade in the late 1970s. A social-democrat, the minister shared IOWO's ideal of democratisation of and through education. He believed strongly in the emancipatory qualities of education. However, Van Kemenade's interpretation of the democratic organisation of education development was diametrically opposed to IOWO's localised and differentiated one. In his view, democratic and emancipatory education could only be truly effectuated by centralised governance.

Moreover, IOWO's ideal of holistic curriculum development – integrated work on materials, pedagogy, examination, etc – did not fit within the centralised support structure that organised educational development according to educational aspects, instead of school subjects. Therefore, IOWO's holistic approach to mathematics education had no place in the new system.

These clashing ideals eventually lead to the closure of IOWO and the establishment of a research group that would eventually gain institutional status again. By the time of the institute's termination, the staff had successfully built a strong network of teachers and other educational actors through the democratic approach and the science with society ideal, and they had published the full model curriculum for primary education. These two factors helped implement IOWO's ideas in the Dutch primary school curriculum in the following decades.

The work of IOWO served as the basis for the later introduction of *Realistic Mathematics Education*, a way of teaching mathematics which became dominant in the Netherlands around 1990, especially in primary schools. Despite strong criticism of this type of mathematics education in the 2000s, many of the core aspects of RME are still present in most mathematics textbooks in the Netherlands today.

Internationally, OW&OC and later the Freudenthal Institute continued to work together with a network of academics and teacher trainers. In the United States, the Freudenthal Institute collaborated with the Wisconsin Center for Education Research

on a curriculum project, *Mathematics in Context*. This collaboration led to the establishment of the Freudenthal Institute USA.[103] In this way, IOWO's idealistic practices were at the basis of the institute's closure, but also of its continued influence in the field of mathematics education. However, the possibilities for OW&OC had dramatically changed and the new research group would never have the same position as IOWO had had. In the end, this history illustrates that policy change was responsible for the change between the 1970s and 1980s rather than a change in educational ideology.

Notes

1. Bishop to Pais, April 30, 1979.
2. O'Brien to Pais, April 19, 1979 (emphasis in original).
3. Kilpatrick, "The New Math as an International Phenomenon"; Phillips, *The New Maths*; De Bock, *Modern Mathematics*.
4. Smeyers and Depaepe, "Introduction," 1–3.
5. de Jong, "Van Wie is de Burger?"
6. Phillips, *The New Maths*, 6.
7. A job profile for mathematics teachers from 2021 lists mathematics's "formative value" as one of the main aspects of its relevance. Platform Wiskunde Nederland, *Beroepsprofiel Wiskundeleraar*.
8. The formative value of mathematics was a topic of debate in the interbellum in some countries, but in the Netherlands this was never really questioned. See La Bastide-van Gemert, *All Positive Action Starts with Criticism*, 16–17.
9. Phillips, *The New Maths*, 23.
10. Ibid.
11. Johan Prytz has shown that this works in the Swedish context. Prytz, "When Research Met Policy"; Prytz, "Towards a New Understanding."
12. Beckers, "A Tale of Two Systems."
13. La Bastide-van Gemert, *All Positive Action Starts with Criticism*.
14. de Rooy, *Een geschiedenis van het onderwijs in Nederland*, 183; Mellink and Oudenampsen, *Neoliberalisme*, 97; Bakker, Noordman, and Rietveld-van Wingerden, *Vijf Eeuwen Opvoeden in Nederland*, 538. This Dutch reform fitted within a wider trend of education reforms in Europe, aimed at making education more accessible.
15. Beckers, "A Tale of Two Systems," 219.
16. Slaman, *In de Regel Vrij*, 32.
17. The term "pillarization" is used to describe the division of Dutch society into four pillars: protestant, catholic, socialist and liberal. Most of public and private life was organised according to these pillars, instead of class.
18. Kennedy, *A Concise History*, 332, 354.
19. Van Lutsenburg Maas, "The 'Mammoth Law'."
20. For a detailed history of the establishment of CMLW, see Beckers, "A Tale of Two Systems," 221–3.
21. Smid, *Theory and Practice*, 216.
22. Beckers, "A Tale of Two Systems," 226.
23. Brandenburg et al., *Verslag van de Werkzaamheden*, 2.
24. Wijdeveld, "Freudenthals Vervulde Toekomstvisie," 158.
25. Quoted in: Ibid.
26. Anonymous, "Stagnatie."
27. Goffree, Treffers and Wijdeveld, "Wiskobasta – Voorlopig Exemplaar."
28. Laban and Masman, "Kamervragen (Aanhangsel)," 29; Anonymous, "Wiskobasta."
29. Beckers, "A Tale of Two Systems," 228.

30. In an article on the occasion of his retirement in 1976, Freudenthal painted his ideal future of mathematics education: as all aspects of mathematics would be integrated into the other subjects, making it superfluous as a distinct subject. Freudenthal, "Wiskunde-Onderwijs Anno 2000," 294.
31. Kindt, *Reis Om de Wereld in 80 Dagen*.
32. Jaarverslag 1974–1975, 29.
33. In 1978, Freudenthal published a book on the science of mathematics education or, rather, on the development of such a science in which teachers and researchers worked together. Freudenthal, *Weeding and Sowing*.
34. van Zanten and van den Heuvel-Panhuizen, "Mathematics Curriculum Reform and Its Implementation in Textbooks," 4.
35. van de Craats, "Waarom Daan En Sanne Niet Kunnen Rekenen."
36. Onderwijs – Leerplanning Wiskobas, 16.
37. Jaarverslag 1974–1975, 27.
38. Personal communication with Martin Kindt.
39. Jaarverslag 1971–1972,18.
40. Jaarverslag 1973–1974, 24.
41. Personal communication with Martin Kindt.
42. Jaarverslag IOWO 72–73.
43. Gilissen et al., *IOWO Informatie Bulletin*, 11.
44. Jaarverslag 1971–1972, 17.
45. Ibid.
46. Gilissen et al., *IOWO Informatie Bulletin*, 7.
47. Slaman, *In de Regel Vrij*, 35; De Jong, "Van Wie Is de Burger?" 74–6.
48. Athen and Kunle, *Proceedings*, 207–8.
49. Ibid., 234.
50. Jaarverslag 1974–1975, 26.
51. Freudenthal dedicated *Weeding and Sowing* to his "dear collaborators from three to thirteen." Freudenthal, *Weeding and Sowing*, VI.
52. Jaarverslag 1975–1976, 30.
53. Jaarverslag 1976–1978, 44.
54. Beckers, "A Tale of Two Systems," 229.
55. Lagere School Begint Voorzichtig Met Wiskundig Rekenen.
56. Van Kemenade, *Naar Een Structuur*, 6.
57. "Maakbare samenleving" in Dutch. Duyvendak, *Maakbaarheid*.
58. Karsten, "Neoliberal Education Reform," 307.
59. Amsing, *Middenschool Strijdtoneel*, 15.
60. Van Kemenade, *Naar Een Structuur*, 3.
61. Greveling, Amsing and Dekker, "Rise and Fall of the Comprehensive School Idea in the Netherlands"; Amsing, *Middenschool Strijdtoneel*.
62. Greveling, Amsing and Dekker, "Rise and Fall of the Comprehensive School Idea in the Netherlands," 276.
63. Amsing, *Middenschool Strijdtoneel*, 29.
64. Van Kemenade, *Naar Een Structuur*.
65. Ibid., 9.
66. Lentz and van Tuijl, "Het Leerplan in Nederland," 16.
67. van Kemenade, *Naar Een Structuur*, 37.
68. Ibid., 41.
69. Ibid., 31.
70. Ibid., 47.
71. Ibid., 52–3.
72. IOWO Planning En Begroting 1974–1975," 18.
73. Jaarverslag 1975–1976, 19.
74. Freudenthal, "Preface," 189.

75. Beckers, "Why to Publish?"
76. de Jong, Treffers and Wijdeveld, "Overzicht van Wiskundeonderwijs Op de Basisschool."
77. Jaarverslag 1974–1975, 28–9.
78. From 1977 to 1979, seven articles were published in *ESM* written by one or two IOWO employees, or IOWO-Team. Goffree, "Johan"; IOWO-Team, "Eleven Minutes Group Work"; Ter Heege, "Testing the Maturity"; Freudenthal, "Change in Mathematics Education"; IOWO-Team, "Class Instruction"; Freudenthal, "Ways to Report"; Freudenthal, "Bastiaan's Experiments."
79. Treffers, "Wiskobas Doelgericht"; Goffree, "Leren Onderwijzen Met Wiskobas."
80. Handelingen, May 1, 1979, 747.
81. IOWO Medewerkers, "Positie IOWO in Discussie," 404.
82. Adhesiebetuigingen Opheffing IOWO.
83. Handelingen, May 1, 1979, 747–8.
84. Handelingen, May 8, 1979, 781.
85. Because of the holistic practices, staff members all had "heterogenous" roles; barely anyone had work that consisted of a single task, making their transfer to SLO practically impossible. Hermes, "Rijksbegroting," 1.
86. Interviews with Martin Kindt and Aad Goddijn. The song referred to the person as an "NSB'er." the term for a member of the Dutch National Socialist party, and a general term to refer to someone who collaborated with the German oppressor during the Second World War.
87. Mulder and Van Ooijen, "Rijksbegroting," 4.
88. Ibid.
89. Ibid., 3.
90. Ibid., 4.
91. Ibid., 4.
92. De medewerkers van het IOWO, "Mededelingen," 326.
93. Ibid.
94. Editorial board, "Het I.O.W.O. moet blijven," 336.
95. IOWO, *De Achterkant van de Möbiusband*.
96. Jaarverslag 1978–1980, 18.
97. Cornelisse, "Gestrand Op de Vrijheid van Onderwijs," 2.
98. Interview with Martin Kindt.
99. Gravemeijer, "Een Realistisch Researchprogramma?"
100. Inspectie Opleiding Onderwijsgevenden, *Het Onderwijs in Het Vakgebied Rekenen En Wiskunde Op de PABO*, 7.
101. Schöttelndreier, "Nieuwe Aanpak Maakt Dat Kind Rekenen Leuk Vindt."
102. Chavannes, "2007+ 1 Is Ongeveer . . . Schat de Uitkomst."
103. The institute moved to the University of Colorado at Boulder, USA in 2005 and has since been transformed into the International Consortium for Realistic Mathematics Education. https://wcer.wisc.edu/About/Project/213, accessed June 16, 2025; https://www.icrme.net/about.html, accessed June 16, 2025.

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