

# AKSF NEWSLETTER

Issue 8  
September 2023



Association Kangourou

Sans Frontières

KANGURI  
IN CLASSE

4 SALTI TRA GIOCHI, PIEGHE  
E MATEMATICA

DEI PESCATORI



Joanna Matthiesen  
Hello and welcome to our eighth  
Kangourou sans Frontières Newsletter

Meike Akveld  
News from The President

Aleksa Malcheski &  
Slagjana Brsakoska  
AKSF Meeting in 2023

Robert Geretschläger  
Paying those Pesky Annual  
Fees What's new?

Ildiko Pelczer,  
Rossitza Marinova  
Canadian Math Kangaroo  
Contest Workshops for Teachers

Michail Lambrou  
Scripta Manent

Greg Becker  
Preliminary findings from the best  
practice survey of the members of  
Association Kangourou sans Frontières

Angelo Lissoni  
Dissemination of mathematical  
culture through games

Özgür Özdemir  
Kangaroo in School

## *Hello and welcome to our 8 Kangourou sans Frontières Newsletter.*



J o a n n a   M a t t h i e s e n  
joanna@mathkangaroo.org

I am pleased to write this short introduction to our eighth edition of the AKSF newsletter. The Kangaroo season has just begun. It's a wonderful feeling to know we entered our fourth decade and engaged over 100 countries who are or will be a part of our organization. This newsletter is full of fun articles starting with our president's introduction about things happening in AKSF and our treasurer's important summary of how to understand the financial activities. In this edition Greg reveals the outcome of the survey that was completed by more than 50% of our members - what a success! Additionally, please read the Canadian workshop ideas that may inspire you to invest even more in our competition organizers - teachers. It encouraged me to start similar activities in my country to support our math teachers. Angelo's fun game introduction and Ozgur's question creativity engagement remind me of the importance of providing fun Kangaroo game activities to our winning students. Then we are treated to another edition of the beautifully written Scripta Manent, in which Michael made my vocabulary richer by recounting the "don't disturb my circles" phrase; this is what I say now to people when I don't want to be bothered. Thanks Archimedes! Reading the articles submitted for publication makes me reflect on how much I learn from each of the writers.

And last but not least our Kangaroo game will be spoken of at the VLAR workshop in Paris, at ICCV 2023:

<https://wvlar.github.io/iccv23/> this October. The workshop will present and discuss findings from the SMART-101 Project: <https://smartdataset.github.io/smart101/>.

**Kangaroo questions were put into test to be solved by Artificial Intelligence (AI) by researchers of MERL - Mitsubishi Electric Research Laboratories and the MIT professors who worked on attempts to test AI math problem solving abilities. The bottom line is that it's a long road ahead for AI to be able to solve Kangaroo puzzles as well and quickly as our students do.**

I look forward to receiving your feedback regarding this newsletter and hearing from new members that have not written before to propose a topic for the next AKSF newsletter.

Wishing you a wonderful Fall,

*Joanna*  
*AKSF Newsletter Editor in Chief*



## *News from The President*

M e i k e   A k v e l d

meike.akveld@math.ethz.ch



Dear Kangaroo friends,  
From the Swiss mountains I am writing this article for our next AKSF Newsletter. I hope you all had a relaxing and inspiring summer and for those on the southern hemisphere a great and not too cold winter.

Well, what has happened in AKSF since our Board meeting in Istanbul? Each board members supervises a few provisional members and / or applicants and we try to help them as well as we can to set up the Kangaroo competition in their country in a way that it can grow and reach as many children as possible. We had a lot of interaction with Africa. Since this year's PAMO and IMO a genuine interest in maths competitions seems to have started to grow on the African continent and we are trying very hard to get more African countries on board of the vessel of AKSF. Through various Zoom meetings and with the support of Greg Becker from South Africa and his platform MyTutor.chat we hope to engage more countries in our competition. It's my true belief that through competitions national networks of engaged teachers can start growing. The vast pool of questions that AKSF provides can lead to a different way of maths education that may prepare our children better for the future (problem solving, critical thinking etc.).

Annual Meeting in Ohrid, North Macedonia. This will be our first "completely normal" meeting since Chicago (2019). The board has decided not to offer a hybrid meeting this year, as we believe it is important that our members gather together. It's part of our tradition that we exchange, we are a family, willing to help and support each other and it will be wonderful to get together again as "in the old days".

I know that the team in Skopje & Ohrid is working very hard to make this meeting a success. I am convinced that we will have a great time, hopefully seeing many of our friends that we haven't seen for many years and also getting to know our new members from all over the world.

However, before we meet in Ohrid, don't forget to rate the many beautiful problems that have been submitted. Our database of questions grows from year to year which is not surprising as the number of members grows too. But in order to be able to have an efficient meeting, the rating process before the meeting is essential. Please make sure you and your team rate all the categories that you use in your country. And don't forget to fill out the survey that we sent you to get an even better picture how things are done in the Kangaroo world all around the globe so that we can learn from the experiences others made.

Let me finally use this opportunity to thank all authors who contributed with articles and in particular Joanna and Özgür and his team who are behind the scenes and make everything work. Thanks a lot!

And please do not hesitate to contact Joanna if you think you have something to write about, or even if you are not sure and want to discuss it with Joanna. We are always looking for interesting articles. In an Association as big as ours it is not always possible to talk to everyone, but the Newsletter allows everyone to read about what all the others are doing and perhaps inspires, starts a conversation, collaboration, or who knows.....

*Take care, stay healthy and see you in Ohrid!*

*Yours,*

*Meike*

*AKSF President*



## ***AKSF Meeting in 2023***

Aleksa Malcheski &  
Slagjana Brsakoska  
kangaroo.macedonia@gmail.com



Dear Friends,

This year's AKSF Annual Meeting is approaching. The preparations are in the final stage. We certainly hope to meet your expectations. The Kangaroo team in the Republic of North Macedonia is eagerly awaiting you with a warm welcome.

We plan a fun activity for everyone: **please, open your photo albums, choose your favorite photos and either send them to us by email (kangaroo.macedonia@gmail.com) or bring them to Ohrid.** We plan to make a display of pictures from the previous 30 Annual Meetings, to remember beautiful moments and people dear to our heart. And here is an incentive: the oldest photo and the most interesting one will receive a special prize and recognition.

Friendly reminder to everyone: **send us your travel details by September 20 at the latest.**

We hope for a good time, wonderful moments with old and new friends and above all fruitful and successful work to be done.



## *Paying those Pesky Annual Fees*

### *What's new?*

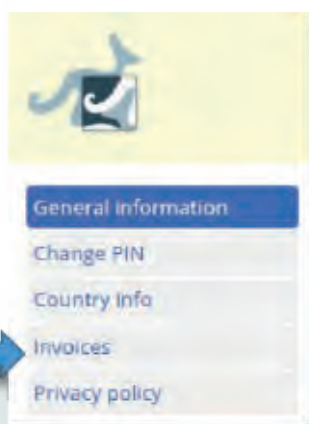
R o b e r t   G e r e t s c h l ä g e r

T r e a s u r e r   o f   A K S F

kangaroo.macedonia@gmail.com



As you probably know, there have been some updates made with regard to payment of the annual fees of our association. The goal of these changes is simplification of the process, for me as treasurer of the association as well as for each individual member. In this note, I will try to describe what is new and to explain how it is hoped that this will simplify matters for all of us.



Also, I will add some background information that I hope you will find useful. First of all, invoices are no longer being sent out individually. Starting this year, they are being placed on the support website for you to download. You can find your invoices by logging into [support.aksf.org](http://support.aksf.org) website and clicking on “Invoices” (the fourth point from the top on the left-hand side of the General Information page). For those of you new to AKSF, note that provisional members joining in the Fall of 2022 or later are exempt from fees. In case you are unsure of your status, just check the “Invoices” folder. If there is no invoice there, you do not need to pay a fee this year.

Some people were confused by the fact that the 2022 invoices were also put here. This was only for your reference, as all fees for 2022 were paid and are current. No actions are required on your side with respect to 2022. In future, you can find all of your invoices here at any time, even if you have saved them somewhere and cannot find them in your own files. This will save all of us the time required to resend misplaced invoices, as was the case many times last year. Also, when your fees have been paid and credited to the AKSF account (a process that can take just a day but may take several weeks, depending on how quickly the bank can process your payment), you will find the receipt in this folder as well. In future, these files will no longer be sent to you individually. You will simply receive a brief notice telling you that a new document is available at the support site.

Some details are still the same. If you need special information on your invoice (like a tax number or the name of a separate institution responsible for paying your fees), please write to me. Your specialized invoice will be uploaded to the support site as soon as I am able to produce it. An important point is the method of payment you choose.

As you should be aware, if you have access to the European banking system, it is best to pay by bank transfer, i.e. account to account. This saves fees, as it is the only type of transfer that does not create extra costs for either side, other than standard bank line fees. If you have this option, it is therefore preferred that you do not pay by credit card, but do pay by bank transfer. (As a minor point, you should know that this option also creates much less paperwork on my side of the transaction, making things easier for me to deal with.)



On the other hand, if you do not have such direct access, and would still prefer to use the transfer option, please be certain that all fees are paid on your side. This is possible in many countries, and some of you have been doing this already. If you are not completely sure that there will be no fees deducted on the recipient's side, please pay by credit card. A transfer fee will be charged (on both sides) in this case as well, but this fee is much smaller. Note that, if the complete amount does not arrive on the AKSF account, you will still have to pay the remainder, which will cause even more fees, of course.

So, to summarize: In Europe, please pay by bank transfer. Elsewhere, it is probably better to pay by credit card. No matter which method you choose, please make sure that all fees are covered on your end of the transfer, so that the complete amount arrives on the AKSF account.

Furthermore, no matter how you pay, please be sure to include clearly visible information concerning the COUNTRY you are paying for. Unfortunately, it is often the case that payments arrive, with painstaking detective work required to determine their source. If you are not sure that this information will be passed on properly, please send me an email stating that a payment has been made.

Finally, a note on prompt payment. As you are probably aware, the final date of payment of the annual fee is December 31st of the current year. Note that this is the final date; paying later than this puts a member in breach of membership commitments. Unfortunately, almost one third of all members had not paid their 2022 fees by this final date last year. Apart from everything else, this created an enormous additional workload for the treasurer (i.e. for me), and if you value my sanity at all (and I would greatly appreciate it if you did), I would request that we all work together to make certain that such a situation does not occur again in the future.

If at all possible, I request that you pay your annual fee before the annual meeting every year. If this is not possible for some internal reasons in your national bookkeeping, please make sure that the money is safely on the AKSF account by December 31st. For many non-European countries, this means that you should be sure to make the payment at least two weeks before the final deadline, as things can go wrong in transferring the fee.

For your convenience, here are the details of the two payment options once again:

The AKSF bank account is:

Account Owner: ***Association Kangourou Sans Frontières, 7 rue de Castellane, 75008 Paris, FRANCE***

IBAN: **FR76 1027 8065 0000 0209 8640 155**

BIC/SWIFT: **CMCIFR2A**

Bank: **Crédit Mutuel Enseignants, Paris Quartier Latin**

Purpose: **AKSF subscription fee 2023, COUNTRY**

The link for credit card payment is:

**[https://www.payasso.fr/Association\\_Kangourou\\_sans\\_Frontieres/cotisations\\_2023](https://www.payasso.fr/Association_Kangourou_sans_Frontieres/cotisations_2023)**

Note that the year number will be changed accordingly in 2024, so you will also have to edit the link if you are reading this after 2023.

I hope you find this information helpful. With the number of members of our association soon passing the century mark, we all have to work together to limit the amount of work involved.

Thank you for your cooperation in dealing with these somewhat complicated issues.

Robert Geretschläger

## *Canadian Math Kangaroo Contest Workshops for Teachers*

Ildiko Pelczer,  
Rossitza Marinova  
chair@mathkangaroocanada.com



CMKC organized a teachers' workshop in 2022. The goal of the activity was to allow teachers to learn about certain math topics covered in Math Kangaroo competition and to encourage them to use provided content in their teaching practice.

In Canada, the Math Kangaroo contest is administered on Sunday through writing centers – mainly, universities partnering with CMKC. In the past few years, CMKC proposed a series of actions to promote a direct involvement of schools: reduction in registration fees for teachers who register multiple students and extending reduced fees past the official deadline. These actions intend to entice teachers to register their students; yet, they do not guarantee that teachers would use Math Kangaroo type questions in their classroom or discuss contest problems in a school setting.

The proposed workshop was open to all teachers. It consisted of four 90-minutes sessions on the following topics:

- 1. Arithmetic and algebraic methods in solving word problems.***
- 2. Logic across grade levels.***
- 3. Measure: area and perimeter.***
- 4. Numbers and digits.***

Since the workshop was open to teachers of all grade levels, our goal was to present topics that are recurrent in different school grades. We aimed to illustrate that teachers in elementary grades can prepare their students to deal with the same topic later on, treated at a different level of mathematical sophistication. A second consideration for the choice of topics was the prevalence of the topic in school curricula. These topics occupy a considerable part of the curricula.

The first session of the workshop focused on solving word problems. We aimed to present a way to visualize and model the relationship between the quantities in the problem. The modeling phase of word problem solving is known to be problematic for students. Elementary teachers can benefit from having more tools for helping students with these types of problems. Teachers are confident in using algebra to solve word problems, but algebra is not an option with younger students. Hence, the usefulness in presenting a method, which allows bridging between arithmetic and algebraic solving of word problems.

The method is known as the bar model method and studies have shown its effectiveness [1]. The core idea is to use segments to represent certain quantities: mass; height; value; price; etc. Then, the relation between quantities is translated into comparison of lengths, whether by difference or ratio. The method allows a transition into algebraic formulation of relations and, especially, of manipulating the relations; thus, offering a visual support for reasoning. The teachers in the workshop were not familiar with the method, yet they recognized its versatility and usefulness.



The topic of “Logic across the grades” was included out of consideration of the role logic plays in mathematics and computing. Logic is in a paradoxical situation in many textbooks or curricula: although it permeates everywhere in mathematics, there is no individual treatment of it – there are no chapters in textbooks dedicated to logic. Logic, as used in mathematics, is meant to be acquired in some sort of natural way by doing mathematics. Unfortunately, such an approach is not bringing the expected results – witness to this stand are the many wrong answers students give to logic questions in the Math Kangaroo contest, and the difficulties students face later in their studies – as documented by studies on high-schoolers’ or university students’ reasoning [2].

For teachers in early grades, we discussed possible ways of representing the information in a concise manner (for example, graph-like structures or tables, as a tool for keeping track and further conclusions). An important element was to highlight the differences between everyday use of logic and mathematical logic. Many of the errors we see in the contest answers have roots in a lack of clear understanding of mathematical meanings of commonly used words, such as “if...then”. Teachers considered the clarification useful, and consequently, became better equipped to bring this type of questions into class.

In general, teachers ask for support in representing information and data in ways that will assist reasoning about the situation. The aspect of “support to reasoning” was singled out by teachers as the most important for them - they are interested in being given concrete tools that can be used in their classrooms: being these models; methods; or some hands-on tools.

The third session focused on measurement: a recurrent topic, occupying a considerable part of school curricula. The main focus was on perimeter and area – two topics known from studies in mathematics education as being problematic for children. We have chosen several Kangaroo questions that target known difficulties in the study of these two concepts. Specifically, we focused on problems that:

- *rely on distinguishing the two concepts (by identifying objects with the same perimeter but different area, for example);*
- *require flexibility in calculating area or perimeter (without formula, only by reorganization of the configuration or using specific properties of figures, for example, rectangles, etc.)*
- *for upper grades, use properties of triangles, ratios of areas, etc.*

Among the Math Kangaroo contest problems, we find a large variety of problems related to area and perimeter – these problems are a treasure trove for teachers, since many of them require focusing on essential features of the area and perimeter concept instead of simple application of formulas.

The fourth session focused on numbers and digits. Our purpose was to show how teachers can integrate these problems into topics seen in school. For example, at lower grades, when discussing different decompositions of the numbers, creating specific numbers with given digits, using different representations from the usual base-ten – all these problems help focusing on the essential aspect of writing numbers in a certain base. Once again, we presented the progression across the grades.

Teachers appreciated the sessions. In the follow-up discussion they mentioned the possibility to use these problems in class, but also as elements to differentiate teaching. The problems can be seen with students, as follow-up questions to the lesson, but they can also be employed as a challenge for more advanced students.

We plan to offer more workshops for teachers. One direction we consider is grade specific workshops where the topic is explored more in depth at a specific school grade level. We envision adding a resource site to these workshops, where teachers find material they could directly use in their classrooms.

#### References

1. Yin Ho, S., Lowrie, T. (2014). *The model method: students' performance and its effectiveness*, *Journal of Mathematical Behaviour*, 35.

2. Herrera, G., Rivera Figueroa, A., Aguirre-de La Luz, K. (2019). *Calculus students' difficulties with logical reasoning*. *Eleventh Congress of the European Society for Research in Mathematics Education, Utrecht University, Utrecht, Netherlands*.

Ildiko Pelczer,  
Rossitza Marinova





# Scripta Manent

Michael Lambrou

lambrou@uoc.gr



*The purpose of this column is to discuss, periodically, proverbial phrases from philosophy, literature or history that are relevant to Mathematics. In each case we explore the origin, meaning, and use of maxims which mathematicians and intellectuals often like to refer to.*

**MH MOY TOYΣ KYKΛOYΣ TAPATTE - Noli turbare circulos meos**

These two phrases are the Greek and the Latin version of the alleged last words of Archimedes (287 BC-212 BC) a few moments before he was killed by a Roman soldier during the siege of Syracuse, in Sicily. Both phrases translate as “**do not disturb my circles**”. Although these phrases are among the most famous sayings of Archimedes, and have been quoted extensively for centuries, neither the Greek version nor the Latin are the exact versions of what the ancient authors, Greek or Roman, recorded. For example the ancient Latin version is given by **Valerius Maximus** (20 BC - 50 AD) at his **Factorum el Dictorum memorabilium** (Memorable Doings and Sayings) Book VIII, as 'noli, obsecro, istum disturbare' (Do not, I beg you, disturb this).

Notice that the word “circle” is missing altogether. Similarly, the Greek versions quoted by the ancient authors are neither the same as the one quoted above nor identical to the Latin, but are variations to one degree or another. For example, the historian Dion Cassius (155-235 AD) in his Roman History, Book XV, mentions the following which I translate from the original. I also write it using the Latin alphabet for the benefit of readers who are not familiar with the Greek alphabet. According to Dion Cassius the phrase uttered by Archimedes was “**(hit me) on the head and not on the diagram**” (**par kefalan kai mi para gramman**) and continues saying that when the hostile warrior confronted Archimedes, he called out: “**stand away, man, from the diagram**” (**apostithi, o anthrope, apo tis grammis**). This exasperated the soldier who then struck him down. In the same vein are the quotes by the philosopher and historian Georgius Pachymeres (1242-1310) in his **Quadrivium**, Chapter 1, who records the phrase “**hit the head, do not obliterate the diagram**” (**tan kefalan plitein, mi tan gramman afanizein**), and by the poet and grammarian **Ioannis Tzetzes** (1110-1180) in his **Chiliades**, Chapter 2, who quotes the second of the two sentences recorded by Dion Cassius. .



*Mosaic (35x27 cm) showing the “Death of Archimedes”, located in the Städtische Galerie Liebieghaus, in Frankfurt. It is thought to be a 16th century, or later, copy of a lost ancient Roman original.*

All the above refer to the last days of Archimedes, around the events of the siege of Syracuse, which lasted two years until it fell to the Romans in 212 BC under the command of the outstanding Roman General and Counsellor of the Roman Republic, **Marcus Claudius Marcellus** (270-208 BC). The military campaign against Syracuse was provoked by the fact that during the Second Punic War Syracuse switched allegiances from Rome to Carthage. The siege itself is well recorded by ancient historians, both Greek and Roman. They all shed some light on the character of the great mathematician and focus on the ingenious war machines he built in order to defend his home city, Syracuse, the so called “pearl of Magna Grecia”. They also stress the great admiration he had from General Marcellus, who in the end captured the city. In fact, Marcellus gave specific orders that the life of Archimedes be spared, but the ensuing chaos after the battle lead to a regretful outcome. The result, as the sources say, saddened the General tremendously. All these descriptions of the siege are fortunate glimpses of some biographical details of Archimedes and they are just about everything we know of him. Unfortunately, a full biography of Archimedes by his friend Heracleides has not survived to modern times.

For the reader’s further study, I enlist the ancient texts that describe the siege and the involvement of Archimedes, but for economy of space I will not elaborate on them. Generally, they are much richer than the few I already mentioned, but I clarify that they do not contain the very last words of Archimedes that we are discussing here. Also note that some historians add variations of the last moments of Archimedes (Plutarch gives three) but the essence remains the same. All these books have been translated in major languages, certainly in all European languages, and should be easily accessible to interested scholars. They are, in addition to the ones already quoted, as follows:

Texts originally in Greek: a) **Plutarch** (45-120 AD), **Parallel lives** (chapter on Marcellus), b) **Polyaenus** (2nd century AD), **Stratagems in war**, c) **Polybius** (220 BC-118 BC), **Historiae**, d) **Theodoros Metochites** (1270-1332), **Miscellanea philosophica et historica**.

Texts originally in Latin: a) **Titus Livius** (59 BC-17 AD), **Ab urbe condita** (From the founding of the city – Rome), b) **Silius Italicus** (26-101 AD), **Punica**.

I only include here, in translation from Latin, the passage from **Valerius Maximus**, **Factorum et dictorum memorabilium** referred to in the first paragraph above. It is from a delightful collection of historical anecdotes that was read extensively in medieval times. It was used in schools of rhetoric, where the pupils were trained in the art of embellishing their speeches with references to historical events:

“I should say that Archimedes’ diligence was beneficial if it had not only given him but also taken away from him his life. Because Marcellus during the capture of Syracuse was convinced that his victory had been delayed for a long time by Archimedes’ machines. However, he was pleased with the man’s exceptional skill, and ordered that his life be spared, because he believed there would be just as much glory in saving Archimedes as in conquering Syracuse. But as Archimedes continued drawing diagrams with his eyes and mind fixed on the ground, a soldier entered his house in quest of loot, approached him with sword raised over his head and asked him who he was. Being deeply absorbed in solving his problem, Archimedes could not give his name but, raising his hands to protect the sand he was writing on, said “I beg you do not disturb this” (**'noli'** inquit, **'obsecro, istum disturbare'**), and was slaughtered because the soldier thought that



he neglected the victor's command; so his blood obscured lines of his art. One can argue that he was first granted his life and then, by reason of the same pursuit, he was stripped of it."

Let us now reiterate: The proverbial phrase *Noli turbare circulos meos* (or its modern language versions such as "Störe meine Kreise nicht!", or "No molestes mis círculos" or "Ne zavarďa kőreimet" or "Verstoór mijn cirkels niet" or "Non guastare i miei cerchi", etc) is a common expression whose origin is attributed to Archimedes. The phrase itself is not to be found in any ancient source, but it is a variation of what classical authors assert. It has certainly replaced the original version to the extent that even its own origin is lost. I have searched extensively the literature but I cannot find with certainty who is the **first** person who published this modified apothegm, in later times. I have come to the conclusion that its birth is somewhere in late Renaissance times, by some neo Latin author. It is certainly not to be found in Erasmus's remarkable **Adages** nor his **Apophthegmatum opus**, which are monumental collections of proverbial phrases from antiquity by a humanist and classicist of top calibre, so we can safely speculate that the phrase came near or after his death in 1536. As an upper chronological limit, I have found several books around 1700's which include the phrase, so it must have originated at a time between the two. For example, it is quoted (in Latin) in the German translation of the original **French, François Félibien des Avaux**, *Recueil historique de la vie et des ouvrages des plus célèbres architectes* (1687). The German translation is entitled **Historie und Leben der berühmtesten europäischen Baumeister (1711)**. Interestingly the original French does not quote the phrase *Noli turbare circulos meos* but it is a small and valuable addition, 24 years later, by the scholarly German translator in his version (see pages 51 and 62 respectively). Other books at that time that include the phrase are **Johann Hübner, Kurtze Fragen aus der Politischen Historia** (1714, see page 323), **Johannes Just Fahse, Atrium eruditionis oder Vorgemach der Gelehrsamkeit** (1718 see page 332 where Mathematics is discussed), the interesting comedy **Christlob Mylius, Der Unerträgliche: ein Lustspiel in fünf Aufzügen** (1746 see page 74), and more. After that time there is an abundance of books that include the phrase, whether they are histories, or educational texts, or dictionaries of proverbial phrases (especially Greek and/or Latin) etc, in every European language. However, without an exception, all misquote the alleged original version. By the way, the sources do not even tell us whether Archimedes uttered the phrase in his own mother tongue, Greek, or was it in Latin, which was the language of the place he lived.

The phrase is commonly used to convey the message than one is to be left alone, in his own thoughts or contemplation. Also, it is used when one advises that an existing situation should not be stirred. Finally, but more rarely, it is used to describe dedication and persistence, especially by a scientist at work.

M i c h a e l   L a m b r o u

lambrou@uoc.gr

## *Preliminary findings from the best practice survey of the members of Association Kangourou sans Frontières*

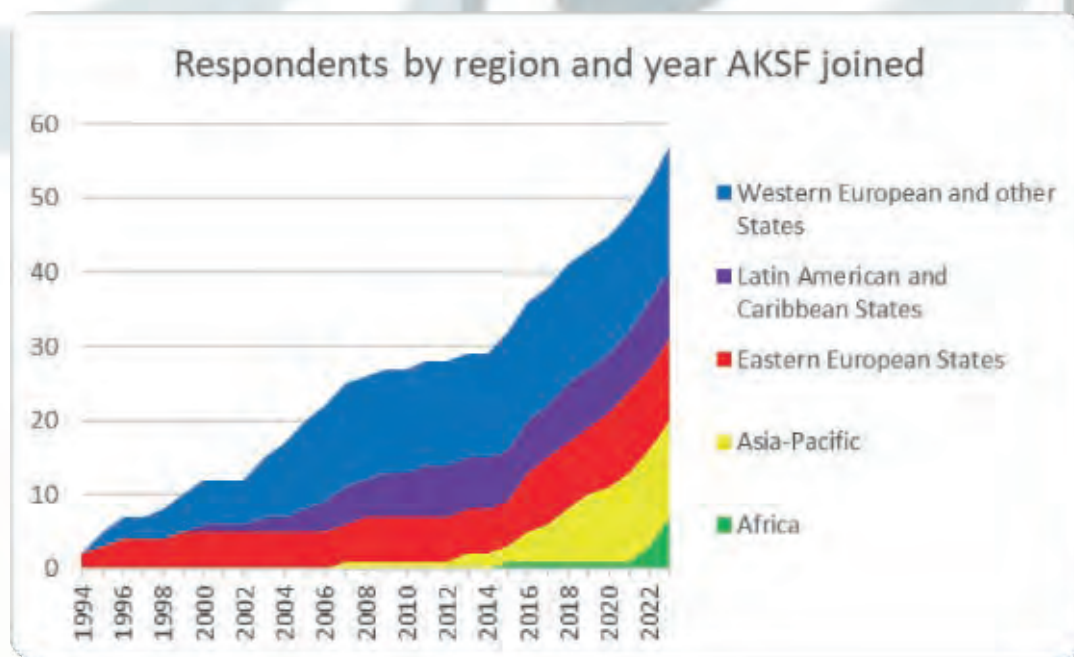
Greg Becker

becker.greg@gmail.com



As membership of the Association Kangourou sans Frontières (AKSF) grows and spreads to all regions, differences in the running of the event have emerged. Greg Becker has run a survey of the AKSF membership to gain insight into what different countries have found to work in the past, and to see what different countries are planning on doing to increase participation in future. Here are some of the initial results.

These results cover the responses received before the end of August from more than 50 countries. (We are still accepting responses as we would like to get the most complete understanding: you can still participate here <https://forms.gle/EgWqUX1KKsanXXeC9>.) The responses reflect the views of all regions (we use the UN classification), and capture the views of both new and experienced members. The survey partly reflects the largely European membership, although it reflects recent membership growth in Asia and Africa:





There is only enough space in this newsletter to cover a fraction of the survey:

1. 38% of respondents only organise the AKSF event, while 18% organise one other event, with the remaining 45% organising multiple events per year. (We did not explore whether this was additional maths events, or events covering other subjects, for example, the Bebras event.)

2. Most respondents (68%) want to organise additional events, even those that were only organising this event wanted to host more. It is an open question as to whether these additional events should be maths focused, harder, or as part of a series to ensure that learners are exposed to fun problem solving events more regularly.

3. When we asked about participation formats, we conflated questions about whether the papers were sent to teachers (either through email, or posted), and whether participation was possible either online or on paper. Just over half of respondents allowed learners to participate both online or on paper, with just under 10% only allowing online participation. Of the 39% that sent the papers to teachers, most did so using the post, although more than a third emailed the papers. Those that joined more recently were more likely to participate online, and there were regional variations: all African respondents allowed participation online and on paper.

4. Analysis of the entry fee required a fuller understanding of the proposition. While a third of respondents don't charge for participation, those that charged were often offering more in return, with the cost covering things like the posting of paper hard copies, physical or digital certificates on completion or even gifts, games, toys or t-shirts. Some also offered an entry fee linked to schools rather than individuals, which made comparison hard, although this pricing model seems to be good at attracting learners as the marginal cost of additional students are zero.

5. In terms of promotion, three strategies were regarded as being the most important: a website, emails to teachers and social media posts. With that said, no strategy was used by all members. There were regional variations - probably reflecting whether learners can be contacted directly, with many contacting learners directly either through email, SMS or WhatsApp and regarding this as important, but also many who didn't do this. There were big regional differences, possibly reflecting cultural norms and differences in regulation. On average, the member countries rated almost 3 promotion strategies to be very important, with radio, TV and newspapers being the least widely used.

6. The respondents are collectively aiming for 10 million participants by 2030 - with the fastest growth anticipated in Africa (off a low base), with the biggest increase in participation likely to come from Latin America where, thanks to Brazil, they are on track to realise their bullish plans.

The responses paint a fascinating picture regarding things like the motivation for running the event (laudable and inspiring), the demand for a pairs participation option (much), the need to host the event in multiple languages in many countries (many need to), the length of the participation window (varies greatly), the various strategies used to deal with cheating (teacher invigilation is not universal), things to help learners benefit (detailed solutions, practice and preparation resources), the potential for more promotion (many plan to do more), and many expressed interest in running additional events. A complete review will be available in North Macedonia, more findings will be presented in the January newsletter, and Greg will be available to discuss these findings with anyone looking to learn from them, either in person at that North Macedonia event or through online sessions.

It is gratifying that so many learners are having a fun maths experience thanks to this AKSF event, but many more could still benefit. Hopefully these findings give you an improved understanding of the strategies others are following, and that this acts as inspiration to revisit your marketing, operating and pricing model. It is clear that no single strategy is universally applicable, and we hope that an improved understanding of the approaches of others will translate into increased participation in your country. Together we can help 10m learners benefit!

G r e g   B e c k e r





## *Dissemination of mathematical culture through games*

Angelo Lissoni  
lissoni@kangourou.it



The organization of the Kangourou contest scheduled in March is not the only duty of ours: our Statute solicits to take care of the dissemination of mathematical culture among young people (article 2). Probably this one is the most difficult task to satisfy. I am aware of this difficulty when reading the various reports sent by the adhering countries and I have already pointed out that at last year General Assembly.

I gathered a small group of professors of the University of Milan, and we set ourselves a goal: to create every year a new original game-box and a 16-page magazine dedicated to the educational mathematics laboratories that can be carried out in the classrooms.

At Orchid, if I will be allowed to do that, I will make a speech to present this new game. On the occasion of the gift exchange, you will be able to see the game and the magazine. The game is CE certified, however, due to copyright reasons, I am not able to give it for free. Anyway, copyright agreements are available.

In what follows I point out the principles we have worked and we will work on.

### *Poligonopoli and more: a reflection on the use of games in mathematics education*

It is well known that learning mathematics involves not only disciplinary content, but also emotional, social and cultural aspects, and it is often in the latter that lies the reason for the negative approach that many students have towards this subject.

The math game contest and the other dissemination activities proposed by Kangourou certainly provide an extremely effective opportunity to improve the perception of the subject, but sometimes it is not enough. In order to involve more students and to provide teachers with valid tools that can be easily integrated into current educational programming, we have designed a series of playful educational activities that arise from the specific needs and difficulties of students, are closely related to curricular content and are designed to be used in small groups, involving the whole class and using the playful context to activate non-traditional learning processes even in the most fragile students.

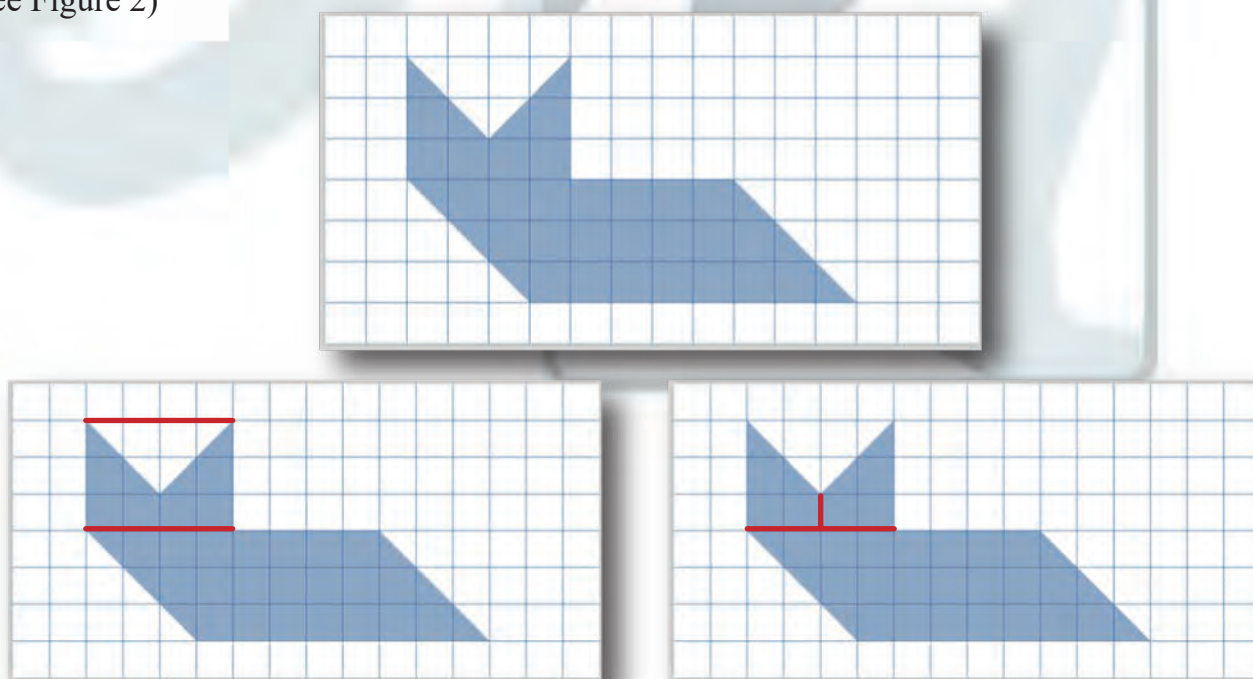
The proposal of game-based teaching activities within math lessons has many advantages: on the one hand, it downplays a subject normally considered hostile and, on the other, it actively involves students in the lesson, transforming them from mere spectators to actors in the learning process.

The playful situation makes it possible to create an informal learning environment in which the student develops both motivation and mathematical skills, thus succeeding in regaining self-confidence and triggering a virtuous circle that, through the improvement of their self-esteem, also leads them to achieve more satisfactory results.

Indeed, the competitive component inherent in the game pushes the student to concentrate, to seek effective and personal strategies and to memorize the mathematical concepts involved. Through the game, students interact with peers, learn to manage time effectively and to work in teams. In addition, when a math question arises in a game context, the student is genuinely interested in understanding the teacher's explanation, both to convince himself of the fact that he or she actually made a mistake (thus losing the chance to win the game) and to avoid repeating it during subsequent games.

An example of this type of activity is Poligonopoli, a game that aims to improve spatial and geometric visualization skills by helping students recognize polygons in noncanonical positions and develop creative and flexible thinking. In fact, the ability to interpret complex figures as the sum or difference of simpler figures turns out to be very useful in tackling more traditional geometry exercises and reality problems.

Without going into the details of the rules (that can be found at <https://www.kan-gourou.it/store/poligonopoli>), the general idea of the game is that players roll dice to move along a path (see Figure 1) and in doing so acquire elemental polygons, which must then be used to purchase figure cards that are offered for sale. The goal of the game is to buy the maximum number of figure cards, which can be purchased if the player has all the elemental polygons needed to obtain the figure by sum or by difference (see Figure 2)



**Figura 2.** *On the top the figure to be purchased. Bottom left its decomposition by a rectangle minus a triangle plus a parallelogram; bottom right the same figure decomposed as the sum of two trapezoids and a parallelogram.*



Once a player makes its purchase proposal, the other teams have to check the correctness of the polygons used for the purchase. If a player makes a mistake by attempting to purchase a figure without having the correct polygons, it is given a penalty point, while if the polygons are correct, the player takes the figure card and the polygons used are placed at the bottom of the deck. The fact that the responsibility for detecting the mistakes is shifted from the teacher to the students makes the latter very careful not only to detect the mistakes of others but also to avoid their own mistakes.

It is worth to notice that the game has been designed so that are not necessarily the "good at math" students who win. In fact, in order to succeed in buying figure cards it is necessary not only to find a correct geometrical decomposition, but also to possess the right elementary polygons, and this depends more on luck in the roll of the dice than on any mathematical skills. On the other hand, for students who are convinced that they are not "mathematically inclined", winning against the "good ones" not only constitutes a form of revenge, but also provides a tremendous motivational boost and can become a valuable source of energy even in view of a greater commitment to more traditional types of math lessons. Indeed, it happens that some students discover their "math skills" for the first time precisely through play, and that it is the playful experience that marks a turning point in their relationship with this discipline.

However, for students with more difficulty in math, it may be helpful to organize homogeneous game tables so that, on the one hand, they can take their time to think without feeling pressured and, on the other hand, they do not slow down the pace of play for more able students.

Finally, on the Kangourou website <https://www.kangourou.it/images/poligonopoli/concorso.pdf> we ask students who have played with Poligonopoli to help us expand the game by sending in their suggestions for new figures. The best cards will be made available to everyone on this site, ready to be downloaded, printed and used for new games! Of course, the cards chosen will bear the name of the class and school that designed them.



## *Kangaroo in School*

Ö z g ü r Ö z d e m i r  
ozguregitim@gmail.com



Is Kangaroo Math just an activity or a competition? How can Kangaroo Mathematics be a more effective tool to popularize math in the field of education? Perhaps because I am a teacher, I also have a somewhat "purposeful" approach to Kangaroo Mathematics. It is in line with the purposes I have expressed in these questions. In fact, the primary aim of our Association is "promoting the dissemination of basic mathematical culture" as is written in the AKSF Bylaws (Article 2.1). However, integrating Kangaroo Math problems into education within or in parallel with the curriculum requires a certain effort. Fortunately, our problems are generally creative, innovative, and original. Thanks to these features of our problems, it is actually easy to integrate them into school life: It is possible to use them as the question of the week or the year, as a research topic on the weekend, or as an interesting question in class. And through these questions, it is possible to reach our students in different fields, from the history of mathematics to problem solving methods. In this way, we also create air holes for students who are drowning in the "rote" approaches that dominate the curriculum or mathematics education, at least this is the case in my own country.

I think Kangaroo Math problems are important in helping students develop a positive relationship with mathematics. However, for this to happen, it is necessary to see that one of the most important catalysts is teachers. Teachers are the ones who will create environments that will attract students' attention and arouse their curiosity by enriching mathematics lessons. Practices may differ between schools and even different teachers at the same school may have different approaches and practices. However, every intention and effort to increase students' interest in mathematics is valuable. And these efforts and methods need to be discussed and shared. In this way, these efforts will increase, become richer and more effective.

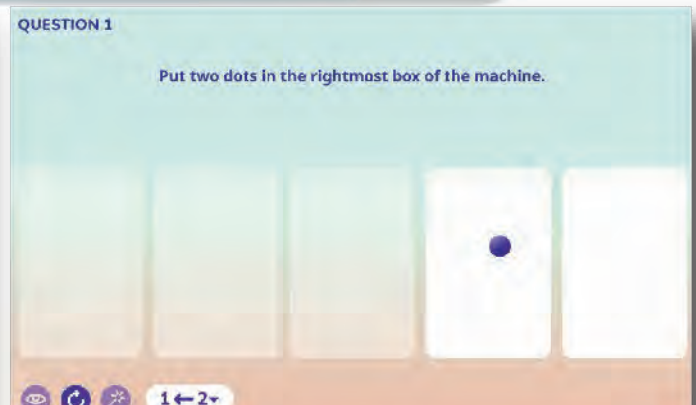
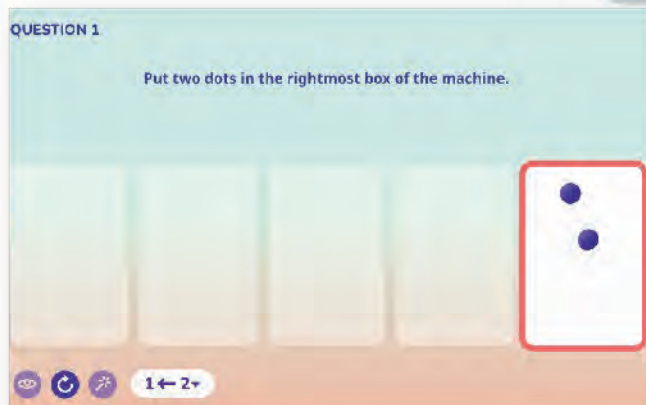
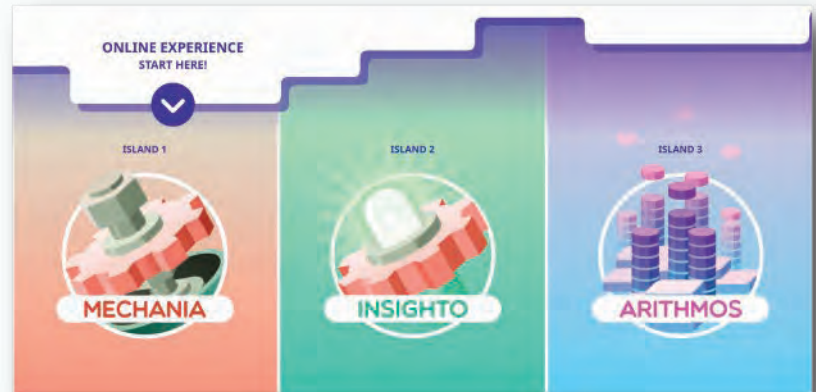
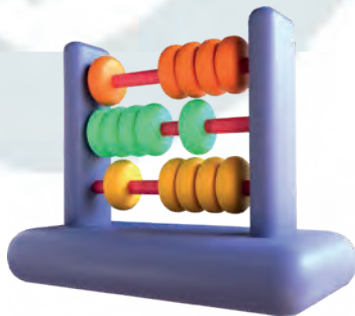
Our association has a very rich history and knowledge in this regard. Different efforts and activities are carried out on this issue in each country, and the results can be observed over the years. It is important to share and present these experiences from different countries. In this way, we will be able to contribute to the development of the field of mathematics education and see the contribution of Kangaroo Mathematics in this field more concretely.



## Exploding dots!

Have you ever seen an abacus? It's just a set of rods with beads on it. On a basic abacus each rod has ten beads which you slide to the top. But the idea is that when you do slide all ten beads to the top, you push them back down again and slide just one bead up on the next rod over. People have been using abaci for millennia for counting and doing arithmetic.

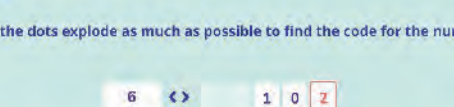
But the amazing thing is, if you take this familiar idea and tweak it just a little, a whole new universe of amazing mathematics opens up to you. Instead of using beads and rods, draw dots and boxes. Instead of sliding beads, make them explode. Now you have ... you got it ... Exploding Dots!



**QUESTION 5**

Make the dots explode as much as possible to find the code for the number 6.

6 <> 1 0 2





**YOU DID IT!**

6

<>

1

1

0

...

.

.

**Discovery #4:**  
You can drag large groups of data into them one box over and do a whole collection of things it is all around!



**CONTINUE >**

**www.explodingdots.org**



## Important dates for the season 2023/2024

Kangaroo day

Thursday, March 21, 2024



### Study problems

1.10.2023 / 5.11.2023

Participants can study problems and Group Chairs can preselect questions.



### Download

#### Proposed Problems

1.10.2023 / 20.04.2024

Proposed problems are available for download.



### Select Problems

11.10.2023 / 15.10.2023

Problems preparation during Annual Meeting.



### Download Selected Problems

18.10.2023 / 20.04.2024

Selected problems are available for download.



### Finalize Problems

16.10.2023 / 3.11.2023

Problems are being finalized (Language and style improvements, corrections..)



### Download Finalized Problems

6.11.2023 / 20.04.2024

Final versions of problems (including latex files and all the figures) are available for download.

