

THE FUTURE

OF  
LEARNING

A BOOK ABOUT

PASSION

CURIOSITY,

AND

FEEDBACK  
LOOPS

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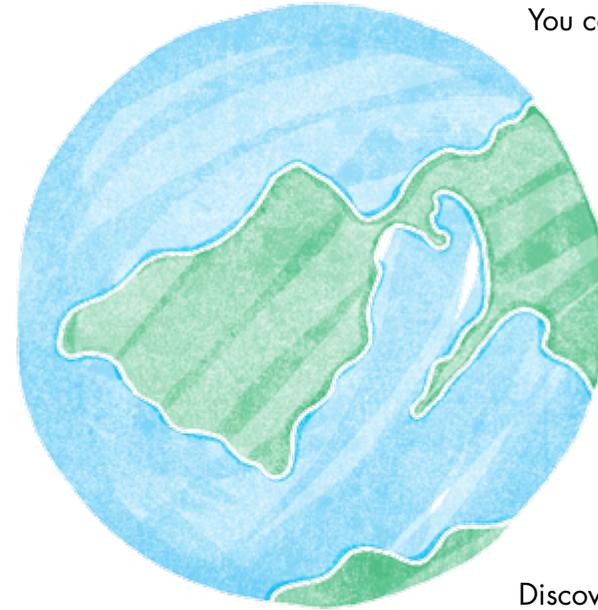
# THE FUTURE OF LEARNING: A BOOK ABOUT PASSION, CURIOSITY AND FEEDBACK LOOPS

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# WHAT IF...

You could help someone learn faster,



Understand more,

Discover the wonders of the world...?

We decided to do just that.  
We're Thinkout, and this is a story about learning.

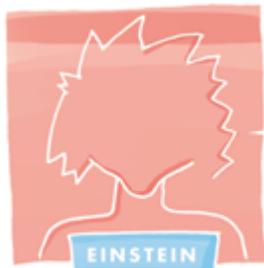
# WHAT IF THAT SOMEONE WAS YOUR CHILD?

Imagine you had the chance to change how your children learn.

Maybe they have abilities you didn't see before, just waiting to be released... Maybe, given the right conditions, they can change the world?

Maybe it will be because of you.

Could you see your child become...?



Him?



Her?



Or him?

# IT'S A STORY ABOUT PASSION...

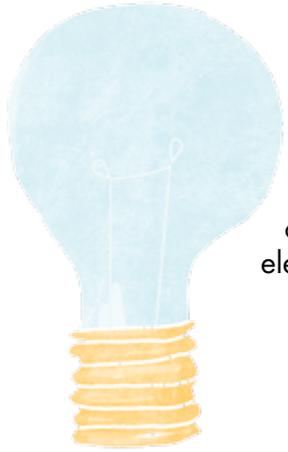
But let's take a few steps back. As we said, we're Thinkout. We'll tell you more about ourselves in a while.

This book is about us (Thinkout) and about what we do (edutainment apps), but, above all, it's about why we do it the way we do it. A bit different, but it has its reasons.

We love passion.

"Passion (from the Ancient Greek verb *πάσχω* (paskho) meaning to suffer) is a term applied to a very strong feeling about a person or thing. Passion is an intense emotion compelling feeling, enthusiasm, or desire for something."

(from the Wikipedia article "Passion")



Just consider what passion make some people do:

Someone tries to construct a light bulb and fails the first 10 000 times or so. And goes on to do it another couple of hundred times, until the world is blessed with electrical light.



Deep in the Rwandan jungle, a woman struggles endlessly to save the scarce gorilla population; fighting corrupt authorities, poachers and ignorance amongst people everywhere.

Passion is what makes us go up in the morning, climb seemingly insurmountable obstacles and endure failures.

Passion is pure force.

# PASSION = INSPIRATION

Passion is not what makes the world go round. It's what's moving it forward.

Passion is something you need if you want to change the world, or if you're determined to do things slightly differently.



At Thinkout we love passion since we admire passionate people. It's a common trait in successful people, although not every passionate person becomes successful. But, with passion, you know failure is a part of the learning process.

We even like to think we have a grain of passion ourselves.



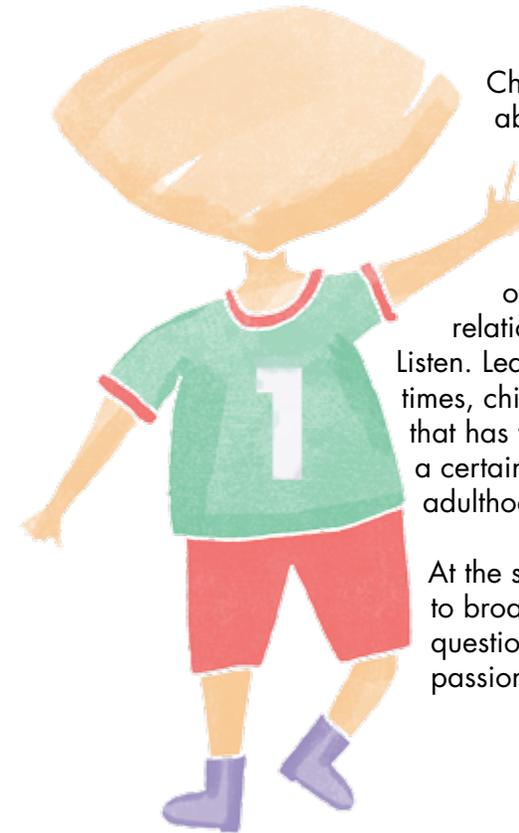
But passion is more than a trait in the successful and brilliant changemakers of the world. Although an inherent trait in those people, it's also an inseparable part of another group in society.

A group where passion is unadulterated, honest and accomplished.

A group where play is first, second and third...

We call them children.

## SMALL PEOPLE AND CURIOSITY



Children are all about passion. The ability to be devoured by play is enviable and an ability most grown-ups have forgotten.

The grown-up world that impacts on children can be a demanding relationship. "Do this, do that. Sit still. Listen. Learn." It's a relationship where, many times, children's nature is seen as something that has to be fought, controlled and put into a certain shape to fit the coming demands of adulthood.

At the same time, children really want to broaden their view. Who has more questions than children? They're curious, passionately curious.

# CURIOUS ABOUT CURIOSITY

It may appear to many as meaningless activity, a mere waste of time, but play is in fact a way for the child to make sense of the world.

In play, solitary or united, children can repeat what they've seen, test rules, practice and rediscover.

Play is curiosity at work.

We love curiosity too...

We're quite curious ourselves. We believe that it's important to enlarge one's view, change perspective and try to see things the way other people do. And the way other people don't. To Thinkout, curiosity is the glue between discoveries, explorations and learning.

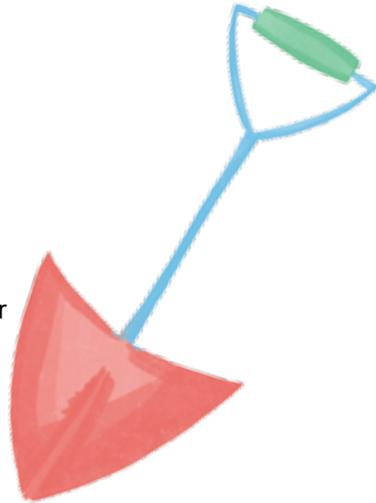
# CURIOSITY AS A PRINCIPLE



What if stimulating curiosity could enhance learning? The idea is by no means new. Still, it's not very commonly used. Play is play, and learning is learning, many seem to think.

But if play is a result of curiosity and curiosity is a way of learning, then maybe we should go for some play when learning?

What if we consider curiosity as a principle of learning, and play its method?



This is what Patricia Babtie, maths special needs teacher at St Richards Primary School (Richmond, UK) has to say about curiosity:

“

The great privilege of being a teacher is to share a child's amazement at the world on a daily basis. Imaginations engaged, they become totally absorbed: the child transfixed by a bee ambling into a flower head; the young boy struggling with a maths problem until his eyes widen and he whoops: "Oh, now I get it!" They take for granted the complexity of the internet that enables them to travel back to join the dinosaurs, or enter fantasy worlds held in the palm of their hands. Teachers can encourage and guide, but mainly we listen and watch, as each young person sets out to make sense of their own special universe.

Accomplishment through personal effort brings the sweetest rewards and children seem to know this instinctively. Not all are sunny and happy; life starts hard for some yet they persevere through tears and tantrums; most often they giggle and wriggle and play. The lucky ones remain entranced by new experiences, which they savour, understand (to their satisfaction) and store, before setting out confidently on the next learning adventure. As the great physicist Richard Feynman said:

"Remember, it's supposed to be fun."

Patricia Babtie

”

# PRINCIPLES OF LEARNING FROM UNESCO

There has been extensive research on how learning can be facilitated. Some of it has been gathered and compiled by UNESCO and the International Bureau of Education. Here are 5 of their conclusions, published in the book *How Children Learn*, by Stella Vosniadou:

§1

On motivation:

“Learning requires the active, constructive involvement of the learner.”

(What we read: Efficient learning and passion are closely connected.)

§2

On new knowledge:

“New knowledge is constructed on the basis of what is already understood and believed.”

(What we read: Start with what is known, start with what is simple.)

§3

On understanding

“People learn by employing effective and flexible strategies that help them to understand, reason, memorize and solve problems.”

(What we read: Apply problem-based learning.)

# § 4

On abstraction

“Learning is better when material is organized around general principles and explanations, rather than when it is based on the memorization of isolated facts and procedures.”

(What we read: To learn is to discover structures.)

# § 5

On adaptivity

“Children learn best when their individual differences are taken into consideration.”

(What we read: adapt, adapt and adapt)

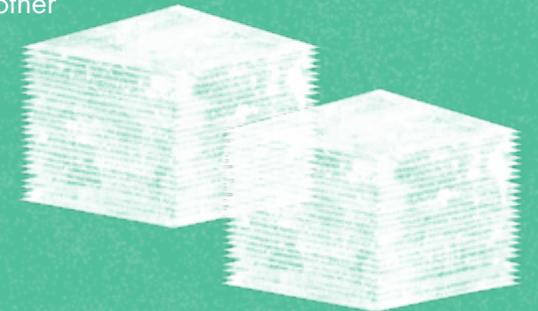
# TRY LEARNING. ONE EXAMPLE, TWO TESTS.

Let's put the idea into motion. We'll take you through a small learning example, involving passion and another important principle.

Start with writing down seven things you're indifferent to on separate cards. Then do the same with seven things you really like (your car, cakes or nature). Mix the decks separately.

1) For the first deck (indifferent things), go through the cards one by one, trying to remember the order. Repeat it 3 times. Then write down the order they appeared in without looking at the cards.

2) Now do the same thing with the other deck (things you like). However, this time, try to write down the order after each time you finish the deck, then check whether you got it right, and throw away the paper. Repeat this 3 times. Finally, after the last run, write down the order.



# TAKE NO. 2, PLEASE

Wasn't it easier in the second example?

Here's why:

In the second example you are to remember things you have an emotional attachment to. Also, equally important, you get to try and evolve your learning during the example. It's a small but crucial difference.

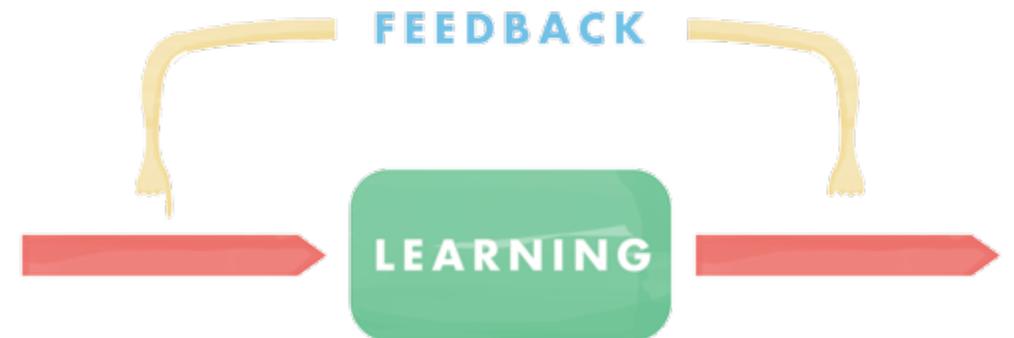
It's called the feedback loop.

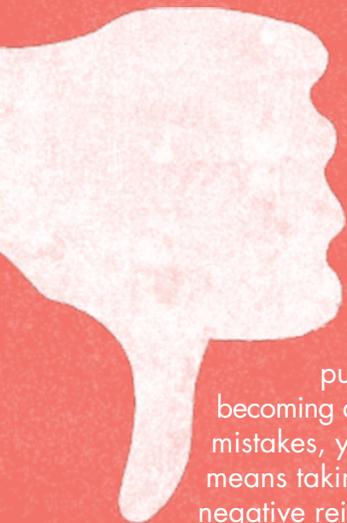
# THE FEEDBACK LOOP

Sometimes we do the same thing over and over again, without improving our results.

But, when we let the past influence the future:

If we modify our way of doing things based on how we did the last time, we're using a feedback loop. "Maybe it goes better if I do it like this? And then, can I improve it further?"





Feedback is great, just feedback isn't enough, though. Feedback can come in good and bad versions. It's so easy to focus on the negative results. However, punishing the mistake will only result in the person learning becoming afraid of making mistakes. And, if you're afraid of making mistakes, you're afraid of trying new ways, since it inevitably means taking the risk of failing. That's a feedback loop with negative reinforcements. To us, it's bad. We like progress, not fear.

## FOCUSING ON THE POSITIVE

We prefer positive reinforcement, with the focus on progress and learning. Mistakes are – just as in children's play – a way of testing rules and asserting that the correct thing has been learned.

With positive reinforcement, new ways of doing things open up.

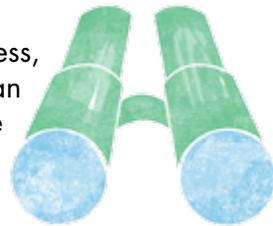


# WHERE ARE WE?

So, what do we have so far?



We love passion. Engagement in what you do is a true accelerator for doing things in a better way. Also, it makes you cope better with the inevitable failures.



We embrace curiosity. It's a fundamental learning process, as seen in children's play. We believe play to be an expression of curiosity and something that can enhance learning.



The feedback loop with positive reinforcement, used in a good way, enhances engagement and curiosity, and can thus further accelerate learning.

# WHAT IF WE COMBINED IT ALL?

Remember, we wanted to create something that enhanced learning. What if it turned out that what we like also happens to be a great foundation for building such a tool?

What if passion for play and curiosity for the world could be used to make children learn faster?



# PRESENTING THINKOUT

Now we've presented a lot of what we believe in. And launched the idea about combining it all. So, why not give a shot at formalizing it a bit?

To make it a project, a company was founded. A brand formed. A name that's supposed to be easy to remember. But it's also a promise. A promise that we intend to follow our own passion.

We are passionately curious about the world of learning.

We are Thinkout.

# thinkout



“

My passion is learning.

Working in leading positions in global enterprises such as Microsoft and Ericsson gave me the opportunity to work with very talented people, some who led the way of technological development. Then, if not before, it became apparent to me that knowledge acquisition is not always linear, and that great things might come from irregular thinking.

Could this be adapted to learning? The question came to me a couple of years ago, and I started exploring whether there was any way of enhancing learning, leaving the beaten track of teaching.

In an increasingly digital environment, I stand surprised to see how little is being changed in adapting methods of learning to new possibilities. Many digital teaching materials are mere screen adaptations of what was formerly written with ink on paper, not taking the possibilities of interaction and feedback into consideration. Since learning is very much about understanding abstract things, which can be visualized to a great extent with digital aid, exploring digital tools has a great potential to enhance learning.

The possibility of moving focus from teaching to learning, from bored kids to engaged students and from repetition to understanding lies ahead of us.

Thinkout is my interpretation of this possibility.

Rolf Skoglund

”

# THINKOUT: VISION

To be the preferred edutainment app producer for digital environments when you want to prepare your child or yourself for the future.

# THINKOUT: MISSION

Our mission is what separates us from others. It's how we're going to reach our vision.

To provide digital edutainment tools, based on cutting edge research, to anyone who wants to enhance learning, based on the idea that learning is optimal when it engages and stimulates curiosity, passion and involves feedback loops.

# WHAT'S THAT IN REALITY?

Nice words, aren't they? But how would it look in practice? With a vision of becoming a leading edutainment app producer and a mission to make enhanced learning accessible to everyone, the task isn't an easy one.

Understanding the world around us is a task of seeing the greater picture. Starting in what is known will make it easier to make sense of what we don't know. The process is called abstraction. In practice, what we do is make the abstraction process come to life.

# NUMBER BONDS - THE INITIAL THOUGHT

Is there any more obvious abstraction process than the idea of 'number'? Number is something we never see, it's one of the most abstract entities we'll ever come across. So much knowledge in the world is based on understanding numbers. A child has to pass from house and houses, sibling and siblings, car and cars and so forth to one car, two siblings, and three houses...

To most children number abstraction is a natural process passed during childhood, and then they are ready to take in other knowledge. Speeding it up will make a child able to learn more, earlier.

Therefore, the decision was simple: Thinkout will start with the foundation of mathematics: the number line.



### 3

Searching through the fields of pedagogy and mathematics, we found Diana Laurillard at the Institute of Education (London University). She deals with children with dyscalculia ("number blindness") and used a game-based method of learning children numbers.

Combining it with our ideas of learning gave us Number Bonds, our first app.

This is what professor Diana Laurillard has to say about Number Bonds.



-RESEARCH-

“

When I first started teaching maths what hit me was the fact that my students had all passed A-level maths, which was an entry qualification, and yet they didn't *understand* mathematics. After 13 years of schooling they still used learned procedures rather than problem-solving and mathematical concepts to solve problems. So that realization turned into a mission – to help students learn mathematics.

Around the same time I began to see the power of digital technologies for giving students a different kind of access to mathematical ideas, so I joined a research team to investigate further, and ended up with an even broader mission – to improve the quality of student learning through the effective use of digital technologies.

Number Bonds is a beginning to what could be a very different way of supporting learning beyond the classroom. No more multiple choice questions, no more 'wrong, try again', but instead 'here's what you did – can you make it work better?' – that's learning in a 'microworld', a very different kind of learning experience. It's applicable to many topics in the curriculum, as well as maths. Today Number Bonds. Tomorrow the basic maths curriculum. Then aspects of literacy, science, and all the academic subjects, emulating the active learning experience we already see in the microworlds for music, graphics, video, animation... all the school subjects deserve their share of interactive microworlds for learning.

Diana Laurillard, professor

”

# NUMBER BONDS – THE BLUEPRINT

It would be really easy to make Number Bonds just another educational game. It even looks like a regular game. And sounds like one. But it isn't.

To make Number Bonds a true Thinkout app, it had to be about passion, curiosity and feedback processes. And abstraction. And we wanted to take all the experience of number learning we could get from our partners at University of London into consideration.

We wanted a game that didn't require the aid of grown-ups. Children in the age of 3-6, which are the ones who would normally use our app, can't read. But they can interact with a smartphone or tablet, using fingers and curiosity...

To our surprise, omitting the tutorial made the game more interesting to the children. Us grown-ups don't know what to do with the game without the tutorial, whilst the children don't know what to do with the tutorial... So, using a feedback loop at the game development gave us an other insight into children.

As an idea Number Bonds is rather simple. The goal is to increase the understanding of the number line, by involving the child in a game where they add integers to the sum of ten. The process of abstraction is taking the child from what they know (size and colors) to what they don't know (numbers).

The first step is adding rods of different lengths and color to reach a fixed length. Then, step-by-step, size and colors are removed, and numbers introduced. In the last step, the child just adds numbers, without the visual aid of anything they knew when starting to use Number Bonds.

By adding a game moment to the learning moment, the app immediately becomes more interesting to the child. However, what separates it from regular educational games out there is that the game play is purely there to stimulate the child's passion and curiosity.



In most edutainment apps, sounds and the game itself are pulling a lot of attention from the learning. In Number Bonds, during the learning moment all sound is shut off and characters used to bring the game alive are removed, allowing the child to focus on the rods.

One of the most important things we've been talking about is the feedback loop. To enhance learning, using positive reinforcements is a winner. It's done in two ways in Number Bonds:

First, only progress is rewarded in the game. By rewarded, we mean that only progress makes something "fun" happen on the screen.

Second, the game uses adaptive technology to optimize the learning process. If the child picks up the idea fast, game speeds up. If the child is picking it up slowly, the game slows down.

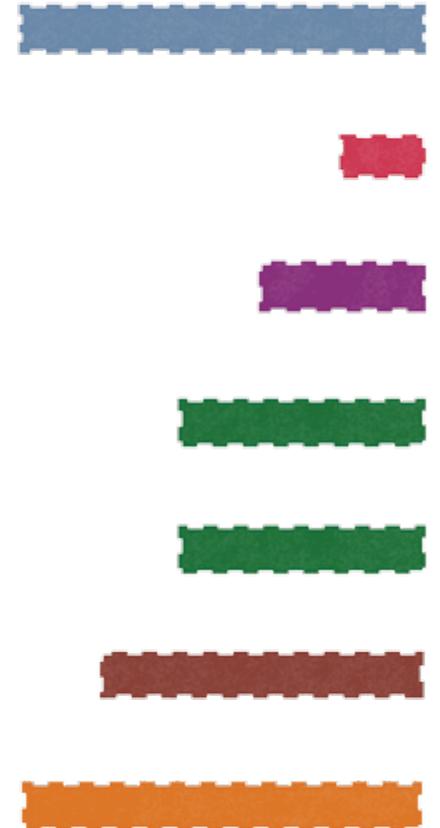


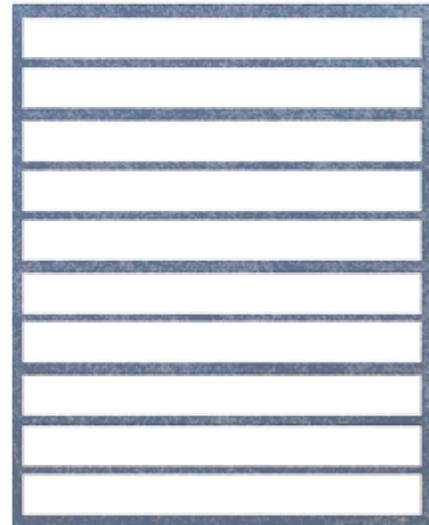
Starting to get curious about Number Bonds?

# AN ANALOGUE VERSION

Try it yourself.

Place a random rod at the bottom of the stack, and find the right rod to fill the line.



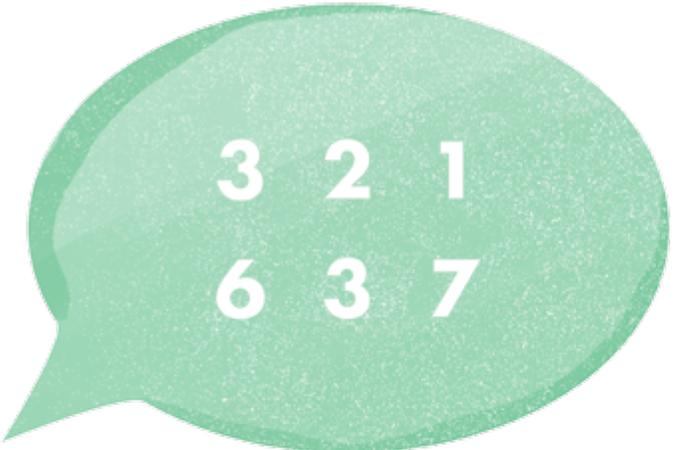


# WHY DON'T YOU TRY IT YOURSELF?

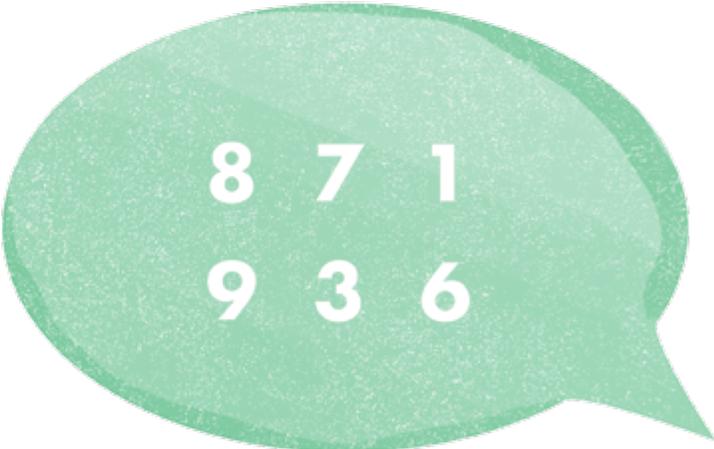


Scan the QR-code, search for Number Bonds by Thinkout in AppStore. Or, here comes the long version:

<http://itunes.apple.com/se/app/number-bonds/id494521339?mt=8>



3 2 1  
6 3 7



8 7 1  
9 3 6

“

Thinkout uses a learning model we know works: catch the learner where she or he is curious and thoroughly engaged in the learning moment and provide positive reinforcement from feedback loops.

Number Bonds seeks to help the user understand the number line, moving from the concrete and known to the abstract and unknown. Using a game structure to engage, without losing focus on learning, is definitely the way to go, and very much in line with the findings and suggestions in my book *Mathematics Education for a New Era: Video Games as a Medium for Learning*.

Dr. Keith Devlin, Co-founder, H-STAR Institute at Stanford University,  
*The Math Guy* on USA's National Public Radios

”

“

# SOME PEOPLE SAYING SMART THINGS

“You can teach a student a lesson for a day; but if you can teach him to learn by creating curiosity, he will continue the learning process as long as he lives.”

(Clay P. Bedford)

“Children have to be educated, but they have also to be left to educate themselves.”

(Abbé Dimnet)

“Liberty without learning is always in peril; learning without liberty is always in vain.”

(JFK)

“Live as if you were to die tomorrow; learn as if you were to live forever.”

(Mahatma Gandhi)

“One of the reasons people stop learning is that they become less and less willing to risk failure.”

(John W. Gardner)

”

# WHAT WE'RE REALLY ABOUT

Here's a secret.  
We love failures. That's what a feedback loop is all about. You learn from your failures. We believe in passion, curiosity and feedback loops because they create an environment where people (children as well as adults) dare to fail.

In an environment where failure is punished, not very much progress is made. We embrace an environment where new ways are celebrated, where original thinking is an advantage. Failure is a natural part of learning and used correctly, it's a great driver in learning.

That said, please don't hesitate to give us feedback.  
Now or ever.

[www.thinkout.se](http://www.thinkout.se)

# JUST A FEW WORDS FOR YOU TO KEEP

Maybe this app isn't for you. Your preferences or choice of methods might be different. So be it.

Here's something to keep anyway (except for a nice book):



If you're stuck when you want to make somebody learn, try to awake their curiosity by doing something they are passionate about, and commend their progress so they aren't afraid to fail.

Now, we're almost done. A few ending words:



# THINKOUT. THE FUTURE.

Our journey has just started. We don't know what lies ahead of us. But, we know that whatever we're doing, it is a story about passion, curiosity and feedback loops. And using technology in an innovative way.

The subject for the future chapters of Thinkout isn't fully clear. It might be about chemistry, philosophy, more mathematics, reading...who knows?

For each app sold, we give resources back to our research partners. That way, methods and techniques can be developed further, and hopefully new findings will make its way back to Thinkout.

Right now, we're looking into an app for children to learn the clock (we might even call it just Clock!), using the same principles as our first app Number Bonds.

No matter what, we're guided by the firm belief that awakening curiosity through passion and reinforcing it with a feedback loop, can enhance learning.

After all, as Richard Feynman said: "Remember, it's supposed to be fun."

## A BETTER WORLD?



Not everyone is a genius.

Nobody will become an astronaut, Nobel Prize Laureate or a new Gandhi from just using an app. We don't aim at giving that kind of dream.

But we do dream of you giving your child the chance to make a try for it. At worst, it will speed up learning of your child. At best... who knows? The sky is the limit.

# THANKS TO...

...all children and teachers in London and Stockholm who, with curiosity and enthusiasm, helped us in the production of Number Bonds.

Professor Diana Laurillard  
Hassan Baajour  
Patricia Babbie, St Richards Primary School  
Dr Keith Devlin, The Math Guy  
Yngve Wallin  
Fanny Skoglund  
Johan Ranstam  
Gustav Skoglund  
Tim Selberg  
Johan Otterud

And to all those who share our view on learning.

A book made by

**thinkout**