

Tan Kah Kee Young Inventors' Award: Our Journey in Paya Lebar Methodist Girls' School (Secondary)

In today's highly technological, globally competitive and interconnected world, one needs to be equipped with the ability and readiness to think creatively in generating solutions for complex problems or issues. This implies the need for Paya Lebar Methodist Girls' School Secondary (PLMGSS) to provide students with learning opportunities and experiences which develop and hone 21st century skills such as creative thinking and collaborative skills, thus enabling them to be ready to deal with real world complex issues as they enter the workforce. In view of this need, a design-based curriculum which incorporates the characteristics of design is adopted for the teaching and learning of Design and Technology (D&T) at the lower secondary level in promoting the development of 21st century competencies, in particular, creative problem-solving, communication and collaboration skills. As a direct outcome of the curriculum, students are given the opportunities to submit their inventions for the Tan Kah Kee Young Inventors' Award.

"Like many great inventions ours started with a problem. When we were asked to come up with a problem and thus a solution, my teammates and I racked our brains for days and nights but to no avail. Most of the problems we thought of either had too complicated solutions or had simply already been solved.

I still remember the night before where the panic of not having an appropriate problem to present started setting in. What happened next was really a blessing in disguise. After entering her house, my teammate, Sarah, left her keys in the keyhole of her main door, potentially inviting strangers to enter her house. It was truly an 'eureka' moment where we found that this problem of leaving the key at the door was a common occurrence and had yet to be solved. After presenting our problem we started working and thinking of solutions to this problem. After we came up with a rough



The Key Buddies reminds users to remove their key from the key hole after opening a door.

It is made of acrylic and contains a circuit that consists of a reed switch, a battery, a buzzer, wires and a light emitting diode (LED). These components form a circuit that closes when the reed switch senses a magnet that will be attached to the door. A magnet is initially attached to the door and the set of keys is hung from Key Buddies. When a key is inserted into the keyhole, Key Buddies will come in contact with the magnet and closes the circuit. A buzzer and an LED will be activated, reminding the user to remove the key once the door has been opened.

The Key Buddies assists in preventing people from leaving their key in the keyhole.



idea of the product design, we started on our prototype. Our first prototype looked no more than a cylinder made of cardboard with a key ring attached to it. We then used this prototype to create an animation introducing our invention.

It was now time to get down to the dirty work! We were all excited to finally try our hands at creating the idea we had worked on for so many months. We sawed, drilled, glued and wired our way to another prototype that looked more like the idea we had in mind. Using this prototype we then entered the TKKYIA. When we heard that our team and another 3 other teams had been shortlisted, we were simply ecstatic. Working closely with the teachers, we then crafted the current and final prototype, presenting it to the panelists at the TKKYIA.

It was truly an honor for my teammates and I to participate in such a prestigious award, and we enjoyed the process as much as the end results. Now as I look upon our product, I feel an immense sense of pride for the hard work and commitment every single member had put in to make this possible. Looking back, every single mistake, failure or disappointment was just a stepping stone for us to create something better, something for us to be proud of."

Tok Jie Ying

Paya Lebar Methodist Girls' School (Secondary), Singapore

In the PLMGSS design-based curriculum for the lower secondary D&T, a 5-stage creative problem-solving cycle was adopted to facilitate the designing process. The cycle starts with problem definition as stage 1. This requires students to identify and analyse genuine real world problem situations in their surrounding environment such as home, school or community. This is followed by peer assessment, facilitated by the teachers, to ensure that the analysis of the identified problem is accurately and adequately defined.



From left, Valerie Alyson Lim Wan Yu, Sarah Yong Pei Ling and Tok Jie Ying

"At the start of this project, I thought that it was a waste of my time and was a burden to me. However, after completing the project, I realised that I actually had a lot of fun and I had learnt a lot of different things throughout the process of making our product. We encountered many problems while making our product. The first problem we encountered was actually coming up with an idea. We did not know what problems we encounter in our daily lives as we often ignore them. Honestly, the idea of Key Buddies came about as I had a bad habit of leaving my key in the keyhole after entering the house. I left my keys in the keyhole one day and got scolded by my mother. It was then I realised that this problem can actually be solved.

After we came up with the problem and wanted to fix it, we started working with the teachers on what we could do to resolve the problem and what features we wanted in our product. We decided what its functionality should be and what was necessary to ensure that our product could be



helpful to others. Working as a team, we also encountered some problems. We had very different opinions on what we could do to, so we often had to "fight it out". We also had some communication breakdown. For example, we always thought someone else would do a certain thing, and thus things were sometimes not completed on time. Knowing where our problems lie, we did our best to change and improve.

We had to redesign our product a few times as we needed to improve the product to better fit the functionality of our desired product. Our first prototype was very large and only had a sound system. After making many changes to our first prototype, we finally came up with a smaller product with more functions. We believe that there is still room for improvement and hope that our final product can help others who face this similar problem. This process has changed the way I view design and technology for the better and has developed an interest for design in me."

Sarah Yong Pei Ling

Paya Lebar Methodist Girls' School (Secondary), Singapore

Stage 2 involves the generation of possible solutions relating to the defined problem collaboratively as a group. This includes studying and discussing the design of current available solutions in relation to the problem, identifying its limitation and redesigning to better suit the problem or generating a new and creative solution.

"The Tan Kah Kee Young Inventors' Award was an eye-opening experience. To have put in so much effort and hard work to design a product and make it to the final stages, it certainly has been a rewarding journey for my team and I. As a female competitor in a mostly male-dominated

competition, I am thankful to have the full support of the school, teachers and family. Although intimidated by tough competitors, I feel that having undergone such a prestigious event has definitely made me more confident and assertive.

Throughout the competition, my team has also been exposed to much criticism which has challenged us to think with a deeper understanding of how a product or certain function works. These critical thinking processes are vital to not only a Design & Technology student but also to a scientist and explorer.

In a new era of technology, one must always view the different possibilities – instead of impossibilities – and be ready to accept new suggestions and improvements. Design is just as important as technology, in that it gives a product a completely new, fresh and exciting direction. Design allows creativity and play to take place within a product; it boosts and enhances a product's appeal to consumers. Practicality, which has a major influence on a product's design, plays an important role in innovating to improve lifestyles.

Overall, the Tan Kah Kee Young Inventors' Award competition has taught me many things, especially to think more freely and to let loose the imagination. It has been extremely encouraging to see brilliant minds all creating beautifully designed products that help solve the problems of everyday life. The power of technology is great; it has no limits. We design and create for a better future. It is this vision that inspires us to keep thinking innovative ideas for a better lifestyle. This is what the journey of TKKYIA has taught me: Always look forward, and never look back."

Chan Sue Yee Abery

Paya Lebar Methodist Girls' School (Secondary), Singapore



The objective of Slidin' Restrictor is to control the amount of shampoo dispensed so that one can regulate its flow. It also helps to reduce the amount of shampoo wastage that can lead to significant cost of savings in the long run. With the use of Slidin' Restrictor, it reduces wastage and consequently helps to protect the environment.

With the Slidin' Restrictor, dispensing shampoo is made easy. Users would minimise wastage as the amount of shampoo dispensed is carefully and precisely measured to ensure users get the right amount that he or she needs.

To operate, slide open the Slidin' Restrictor. Choose your desired number of layers. Do note that the higher number denotes less amount of shampoo dispensed and conversely, the lower number indicates more amount of shampoo dispensed. Place the Slidin' Restrictor onto the neck of the shampoo bottle and press the cap to dispense the shampoo out. Other kinds of bottles such as dishwashing detergent and hand soap bottles can also be used for the same function.



From left, Chiu Wei Na, Chan Sue Yee Abery and Niko Tan Jia Li

The next two stages, stages 3 and 4, require the students to deliberate collaboratively on the best solution, from amongst the many possible solutions generated, to adopt and test out. In stage 5, the results obtained from testing out the solution are evaluated to assess the effectiveness of the solution in solving the defined problem. And if the outcome of the evaluation is not desirable, the cycle will be revisited to relook at the design of the solution from stage 2 onwards.

"The creation of a new device requires a great deal of imagination and a keen sense of observation of the surroundings to find a simple solution to a problem. The most challenging part in coming up with a useful solution is in making it simple. When I first started this project, it was little more than a school-based activity together with my friends because I didn't think much about it or how it could open doors for me. I never saw myself as an inventor, when other inventors were have thought of marvellous large-scale solutions for what was once thought to be unsolvable problems. However my journey through the TKKYIA project changed my opinion entirely.

My team and I focused on the problem of people commonly leaving their keys in the keyhole. Though it didn't seem significant, we realised that it is a problem faced by everyone at least once in their lives. We initially came up with complicated solutions, thinking that "complex is better". After many reviews and consultations, we finally designed a very simple contraption as our breakthrough solution for that everyday act of forgetfulness; a keychain with a buzzer. Of course, as with other inventions, there were failed attempts and disagreements throughout the process. However, it all was worthwhile after receiving affirmation of our invention.

The celebrations did not stop at the award and the recognition my team received. What really made me proud in the end was that not only were my team and I among the first batch in PLMGSS's breakthrough in Design and Technology, but our award also breaks the

stereotype that there are few women in the engineering field. The prize, 2nd in the school award, was a huge form of encouragement to all students in my school, as well as other aspiring young inventors, showing that creating an invention is not gender or age biased, and that they too can be confident and create a solution to anything.

It truly was an enriching experience, one that should be established in other schools as well. As much as it should be the case, people rarely have an opportunity to turn their ideas into workable solutions in life. As participants in the TKKYIA, we gained a deeper understanding of what being an inventor meant. Inventions don't have to be big or impressive; they just need to come from big creative ideas. After all, a solution is only an idea away. As long as you can think of it, you're already halfway there!"

Valerie Alyson Lim Wan Yu

Paya Lebar Methodist Girls' School (Secondary), Singapore

In conclusion, design plays an important part in the 21st century education as it does not just build cognitive abilities such as critical and creative thinking and problem-solving, it also develops dispositions such as perseverance, flexibility and adaptability which are needed in 21st century workers. With the Tan Kah Kee Young Inventors' Award organised annually, students will always be motivated to design and create new inventions.

Mr Indra Ahmad

Paya Lebar Methodist Girls' School (Secondary), Singapore

