INTER-STEMLLAR
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To our readers,

Thank you for all the wonderful feedback we got from Issue 1.

We all hope you enjoy this issue just as much as the last.

Innovation is truly a confusing, wonderful buzzword thrown around by almost everyone. Every pioneer, mogul and business leader recognises its importance in today's world, but no one can quite seem to agree on what it really means. At the Innovation Team, we have boiled it down to one simple definition: Turning an idea into a solution that adds value to the customer's life.

Innovation is the pulse of our world, hence the name, HartBeat. It is a metric for humans to gauge our growth as a society, and is a catalyst for social, technological, and economic progress.

Through this monthly journal, we hope to inspire students across Hartland to look for issues in their own lives, and formulate their own creative solutions to them.

AVI KAPUR
Editor-in-Chief

"Innovation distinguishes between a leader and a follower." - STEVE JOBS
DATA SCIENCE: REINVENTING EDUCATION

Avi Kapur, Year 11

The education industry is going through a parallax shift – one that’s being driven by technology. One field that is contributing to the classroom of the future is data science.

Data science is a widely misunderstood area of study. Simply put, it is the use of huge amounts of data to find patterns, and use those patterns to find meaningful information and then make decisions based on those outcomes.

Great, but how does this fit within the realm of education?

We’ve already seen education take advantage of data science – many of our classes use online-based learning, like Seneca or SmartRevise. These tools use analytics from the student’s performance – what questions they consistently get right, what they’re struggling with, how long they take on each question, etc. Based on this data, the platforms use algorithms to cycle through the questions and help fill in gaps in the student’s knowledge.

Outside of the classroom, it is also used to analyse the student’s strengths and interests. Through the various different personality tests, these algorithms use the data gathered from hundreds of thousands of leaders across the world, their strengths, their weaknesses, leadership styles and more. Then, predictive models use the aggregate data to pinpoint careers in which the student is statistically likely to be successful in.

Looking toward the future, data science will only become a larger part of education. As data analysis techniques become more advanced, and are able to deal with more forms of data such as
This trend will carry on beyond K-12 education, up to university-level learning, where many courses are going online. Through the exponential rise in data being created, it is only becoming a more and more probable reality that data science will become an integral part of how schools, classes and the global education sector as a whole is run.

Apart from helping class performance and intellectual discussion as a whole, it can help in more impoverished, undersupplied areas. Many of the issues in modern education will look to potential modelling and prediction tasks. These could help with student attrition and dropout rates, attendance, detentions and problematic student behaviour, learning delays, prejudice and bias in grading, and so much more.

What data science will do is democratise the level of education worldwide, by giving students in lower income areas many of the tools as well as uplift the quality of learning there, making for a more equitable playing field – it can help students falling behind, and boost students with talents in their fields. This will have a tremendous impact on the future of the job market afterward as well, and shape society itself.

"What data science will do is democratise the level of education worldwide"

psychological, education science that have more nuanced theories of human cognition. This will result in the ability to process video and voice recordings of classes, as these become more prevalent and provide rich data to be analyzed through novel computational means. It can help bring up the most effective classroom management strategies available to teachers, and optimise lesson plans individually based on class dynamics.
THE HOPE PROBE AND EMM

Peter White, Year 11

Last month, the UAE sent a probe to Mars, an absolutely momentous feat that is a true testament to the leadership of the UAE. At just under 50 years old the UAE has become the 9th country/territory to reach Mars, with only a previous 49 attempted spacecraft missions to Mars to date. The Hope probe launched from Japan’s Tanegashima Space Station on the 20th of July 2020, only arriving early this year, entering into orbit on the 9th of February, marking a milestone for the UAE and it’s constant strive toward innovation and progress.

The three goals of the Hope probe according to the official website are to:

- Understand climate dynamics and global weather map through characterizing the lower atmosphere of Mars.
- Explain how the weather changes the escape of hydrogen and oxygen through correlating the lower atmosphere conditions with the upper atmosphere.
- Understand the structure and variability of hydrogen and oxygen.
in the upper atmosphere, as well as identifying why Mars is losing them into space.

In eventuality, to create the first complete picture of the Martian atmosphere.

The spacecraft was fitted with three highly advanced optical sensors. The EMIRS, an infrared spectrometer studying the lower atmosphere of Mars, measuring the global distributions of ice, dust and water vapor, as well as temperature profiles. The EXI, a high resolution, 12-megapixel camera used for studying the lower atmosphere in visible and ultraviolet light. The sensor has multiple filters and is capable of capturing 180 fps 4k video at full capacity. The third instrument is the EMUS, which only detects ultraviolet wavelengths, determining the abundance and variability of the concentration of atmospheric carbon monoxide levels. It also calculates the structure and variability of oxygen and hydrogen in the exosphere (which is a thinner, atmosphere-like volume surrounding a planet such as where molecules are gravitationally bound to that body, however the density is so low that the molecules practically never collide). These three instruments will aid in the investigation of the atmosphere of Mars, from gasses such as oxygen, hydrogen and carbon monoxide, to water vapor and ice clouds.

The Importance of Mars Exploration

So why is it important to study Mars? After all, Mars exploration has cost billions already. With the Hope probe costing around $200 million, and the Perseverance rover costing over 2.7 billion dollars. Not even mentioning the other 47 attempted missions which all add up, becoming a quite expensive total which many people argue that could be used on other things. Problems in the world that could easily be solved completely, or at least greatly impacted by the large sum of money.

There are many reasons to explore other planets and space, probably the most popular of these reasons is to find a suitable location for sustaining human life sometime in the future. Supported by sci-fi pop culture and avid enthusiasts looking for excitement for an adventurous future. However, it isn’t only the future we look towards when exploring space and Mars in particular, but to the past. The origins of life are still a mystery which needs exploring and Mars may hold vital clues to it as experts believe that billions of years ago it housed some life. Mars is also an incredibly interesting planet as water has been found there. Although in states of ice and water vapor it isn’t particularly useful for sustaining life, it hints at the possibility of vitality and leaves plenty to discover. The development of technology also has gone hand in hand with space travel, with inventions such as camera phones, created initially to fit on spacecrafts with scientific quality. Everything from prosthetic limbs to baby formulae was influenced by the exploration of space and development of subsequent technologies. Not to mention satellite systems, gps and all the benefits they have brought to humanity, leading to further advancements previously thought of as impossible. So, although the exploration of space, and the many projects, successful and unsuccessful, to Mars have been incredibly expensive, they aren’t without benefits, helping lead the worlds technological advancements well throughout the 20th century and...
After listening to my dad and elder brother animatedly discussing something called Bitcoin, I got interested. What exactly is this Bitcoin? Is it something you can invest in, like in a stock market? Wait, what is a stock market? The concept behind the stock market is simple. It lets people buy and sell small parts of a company (shares) among themselves. When the company’s performance improves, investors holding the shares make a profit. When the performance goes down, they lose money.

Bitcoin isn’t a share, though. It is like the US dollar or the UAE dirham… it is a cryptocurrency (a digital currency) that can be used to (eventually) buy things.

Bitcoin from the eyes of a 10 year old

I was a little confused about why Bitcoin is becoming so popular. And is it really a good investment option? I had many other queries. So, I looked for the answers, and will share them with you!

1. Bitcoin is meant to be an alternative universal currency; a currency that doesn’t belong to any one country. The American dollar belongs to the US, the sterling pound belongs to the UK, and so on. But Bitcoin is now owned by any country or government.

2. Bitcoin is useful as a form of money. This makes it simpler to use anywhere in the world, instead of using different currencies in different countries. In short, Bitcoin is available to many people.

3. Bitcoin is distinctive as it is the world’s first digital currency. Its value essentially comes from it being the first digital currency that no one has control over. Fortunately, anyone can buy it!

4. With these properties, all that is needed for a form of money to hold value is trust. But this is also what makes it risky. Bitcoin isn’t backed by any country or government. Like in the case of gold or other precious metals, its value is decided by buyers and sellers.
5. Bitcoin’s convenience makes it so popular. Bitcoin isn’t the only cryptocurrency, by the way. Other cryptocurrencies too are gaining popularity as plenty of customers are accepting them in their businesses. An example is Tesla, which has announced that it will soon start accepting Bitcoins as payment for its cars.

6. Bitcoin is getting expensive. One Bitcoin was worth less than 2,500 AED in March 2014. Today, seven years later, it is worth 189,150.68 AED! So, why is it so expensive? First of all, you know that each country can just print unlimited money, right? America, for example, can print as many dollars as it wants (not fair!), which makes the currency weaker every time a new set of notes is printed. Well, there is a limited stock of Bitcoin, there are only 21 million individual Bitcoins. Now, that may sound like a lot but, in terms of money, there are billions and trillions of dollars! 21 million corresponds to much less than that.
Can screen time and playgrounds be combined?

Well, that is what company Biba believes.

Biba combines screen time with family outdoor time to ensure that more and more children are getting out in the open. How it works is that the parent downloads the Biba app and scans the Augmented Reality (AR) tags to initiate a playful and imaginative game.

The games range from catching butterflies to raiding ancient temples and they are designed so that children are more physically active and make the most out of the equipment located at the park.

One of the best things about this is that the parent is in control of the device, never the child which means that child's screen time is not increased due to this. It is also tried and tested – Biba has committed heavily to user-testing, field work and consultation with partners such as the RAND Corporation and Simon Fraser University. In fact, peer-reviewed research published in the Journal of Child Health Care, confirms that "kids truly get more active on playgrounds when using our games vs. standard playground play". It is also personalized to every individual park and Biba games have the added bonus of being able to tally up patterns about Biba playground use for local park owners to learn more about what's working and not working in playgrounds!

Knowing what the peak days and hours of playground usage are, what the impact of weather is on your community's play and what the favorite pieces of equipment are helps local municipality to figure out the next best steps in adding things to local playgrounds or when planning new regional recreation spaces in areas. Biba was also awarded one of TIME's Best Inventions 2019, one of FAST COMPANY Most Innovative Companies 2019 awards and a nomination for best branded games at the kidscreen awards.

You may be wondering how large such an innovative project is and may be surprised to find out that they have over 4500 Biba locations in 10 different countries such as the US, UK, Ireland and even Malaysia! Unfortunately, they haven't made their way to Dubai yet, but you never know when we might see this amazing project in the future.
Artificial intelligence software can already be found in several classrooms around the world. In fact, it’s entirely likely that you have used it before, you just might not have realised it.

Computer programmes have already been developed that can analyse how well you understand something, what your strengths and weaknesses are, and suggest material which might improve your performance. As the rapid development of this software continues, what are the implications for learners and teachers in the future?

What might classrooms look like?

Teachers will walk into classrooms and sit down at their computer. Instead of logging in, they will be able to use voice command and facial recognition software to access their files. Once logged in, a simple question and answer process will be initiated.

“Computer, tell me who didn’t understand yesterday’s lesson?”

Using analytical software, the computer will be able to read data on student performance and indicate where students are with their learning.

“Computer, can you suggest a course of action for these students?”

Next, the computer will read through the work that students have produced, analyse where any possible misconceptions might be, and suggest a starting point for teaching.

What are the benefits for students?

Perhaps the most obvious benefit will be the opportunity for students to work and receive feedback more independently. The more that students interact with the technology, the more it will learn about them. With that information, accurate predictions, support and analysis will follow.
As students research topics, it will be able to accurately suggest articles and ideas that are suitable to the age and ability profile of the learner. Not only that, students will be able to receive almost constant real-time feedback on work they are doing. Imagine working on your maths homework and as you finish a question, each step of your working is assessed in real time. Any mistakes you make will be highlighted and explained almost instantly.

Can AI replace teachers?

It seems highly unlikely. Whilst AI software can undoubtedly be beneficial, there is still some way to go in terms of physical integration with classrooms. The most likely scenario is that teachers are supported by AI assistants, which will help to streamline much of the time-consuming work that they do.

It’s worth remembering that teachers are experts in their chosen field with years of academic study underpinning their work. Not only that, they build incredible expertise in working with young people, recognising their talents, abilities and supporting their emotional wellbeing. Then, there are all those hidden things that teachers do that turn the building from an educational facility into a school.

While the prospect of AI integration into classrooms is exciting, and the potential for development is significant, teachers will continue to do what they do best, teach.
On Wednesday 17 February 2021, my mum, my friend, and I went to the Expo 2020 Sustainability Pavilion in Dubai.

Due to COVID-19, the original opening date for Expo 2020 of October 2020 was delayed. Expo 2020 is now opening in October 2021 (we hope) however, the Sustainability Pavilion “Terra” has been pre-opened to the public with limited numbers.

I thought the Expo 2020 Sustainability Pavilion was fantastic, although I didn’t see any robots, I did see a lot of interesting fun facts about sustainability. The building had a slanted roof and a gigantic solar panel on top and was surrounded by solar trees. The sign explained that when it is raining, the water washes down into the middle of the building to be collected. When it is sunny the solar panels collect sunlight and turn it into solar energy to power the building. There were solar trees that had solar panels in them and as the sun turns, they turn with it to get the optimal energy usage from the Sun. The building itself was very beautiful.

The first stop on our tour was the games room, where you would play games that tied into sustainability and were fun at the same time. The games focused on the Earth’s temperature and keeping it from getting too warm.

The next stop on our tour was the forest, there were plaques that explained microbes and their importance to soil. There were interactive games about biodiversity loss, land use, and the impact of human activity on our planet as well as what happens to humans and nature because of too much pollution. Next, we saw the “Room of Consumption,” this room showed us the impacts that we have on land use and our consumption habits turning everything natural into waste. The room was like a factory taking in resources and spitting out things we buy. There were “levers of decisions” where you have two choices about the environment. There was a section about water saving and water use, it was interesting also. This section tried to demonstrate different farming methods including hydroponics and aquaponics versus traditional farming methods on the land.
The final stop on our tour was the ocean, this section highlighted the impact of overfishing, over-consumption, and the impact of waste in waterways and oceans. Examples include the sea life being strangled by plastic, dying due to ingestion of plastic waste or pollution in waterways. It was very very sad.

The overall experience of Expo 2020 Sustainability Pavilion was amazing, the staff were nice, the games were fun and the safety measures regarding COVID-19 have been kept in place. We also learnt a lot on the way. I can't wait to go back when the whole Expo 2020 opens so I can see the robots and other pavilions.
I'd like to say thank you to the Innovation Team for helping create this journal. I'd also like to give particular thanks to the following people:

Mr Statham, for heading the Journal, helping bring the Innovation Team together for this.

Our contributors, for working tirelessly on the articles that make up this journal.

Thank you to everyone for making this possible. I'm ecstatic to see where this project will go next.

– Avi Kapur
Editor in Chief.

WANT TO GET INVOLVED?

If you've read, heard about or found some interesting innovations, please let us know and we will feature the best article submitted on our next issue.

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