

Jake Xuereb

Curriculum Vitae

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I'm interested in what fundamental truths Quantum Information can tell us about the Universe. All the way from gravity to thermodynamics, and how Quantum Computing can be the tool through which these truths are uncovered.

Education

- 2017–2021 **B.Sc. (Hons) Mathematics and Physics**, (currently Year III), University of Malta, Msida, Malta, Expected classification: *Second Upper*.
Magna Cum Laude
- 2015–2017 **A Levels**, De La Salle College, Birgu, Malta.
Attained A-Levels in Mathematics, Physics & Chemistry with Intermediates in English & Philosophy.

Projects

The *forced* Quantum Rendezvous Problem

Supervisors Almudena Carrera Vazquez

Repository <https://tinyurl.com/y2brttzy>

Description I was invited by IBM to attend the 2019 QISKIT Hackathon at Schilthorn and chose to present the idea of working on taking a quantum approach to the Rendezvous problem where one has to present an optimal strategy for two people to meet in a maze of n rooms. My pitch garnered a team of 4 people (2 PhD students, 1 M.Sc. student and an undergrad) whom I worked with on this project, one of 25 out of 50 to make the final cut. After realising that the restraint of the people not being able to communicate was ruining the quantum approach we modified the problem giving a *god* type character access to a quantum computer and created an algorithm which resulted in the agents meeting in one of the rooms with definite probability and our ability of being able to predict which room they will meet in being probabilistic. The algorithm was based on Grover Iteration but for more information and circuit diagrams please visit the repository. This was my first experience working on a quantum information problem with other people and really cemented my wish to continue working in the field. An image of the team is shown on the next page.



LearnD

Supervisors Dr. Jean Paul Ebejer

Website www.learn-d.com.mt

Description Having been extremely frustrated with the state of private education in Malta my friend Luke Collins and I, under the guidance of Dr. Jean Paul Ebejer, pursued the University of Malta's 2017 Seed Fund Award for Start Ups and won €13,500 to build a mobile app. We called this mobile app LearnD and its purpose was to connect university students with younger students that need help in their studies. After two years of working on the idea alone we sold a majority of the shareholding to a private entity which has been able to better finance and support the idea. Throughout all of this and to this day, I have managed the project with two people working on marketing and two people working on the app's development. This project really helped me strengthen my leadership skills and taught me a lot about managing a project with finances involved especially applying and for grants and setting budgets. It also helped me hone my public speaking skills. At the end of this CV you will also find a news article about this project. Below is a photo of the team I lead.



LaTeX Note Taking

Description There are few pleasures in life equal to sitting down with a good book and producing a nice set of notes from that book. Earlier in my undergraduate, much to chagrin of my marks, I would produce such notes for different units, a selection of which are available on my website.

Sample Notes on Introductory Real Analysis

Professional Experience

Summer 2019 **Freelance Project Management & Design**

Description I have had the pleasure of consulting on the functional design of a few software start ups creating specification documents for them. Most notably has been the design of a web app which allows users to accumulate points for using alternate and green modes of transport which can be exchanged for rewards. Aside from this I have also helped design a grant proposal for the same company to use computer vision and machine learning techniques to make intelligent use of currently unused traffic video data monitored by Malta's government.

2017 - 2019 **Maths & Physics Tutor**

Description

- Prepared 20+ students for their O-Level, Intermediate and A-Level exams in these subjects functioning as a one-to-one tutor. Focusing on fixing misunderstandings and working on achieving tailor made strategies for each student.
- This job allowed me to make use of my passion for the Sciences and also hone my verbal explanatory and delivery skills.

Talks & Conferences



9th Oct 2019 I gave a short talk entitled "*What do pentagons and baryons have in common?*" at the first meeting of the reinstated Malta Mathematical society about how the Euler characteristic of objects determines their properties like how the Euler number of a truncated icosahedron leads to footballs having 12 pentagonal faces and the Euler number of Tian-Yau manifolds could explain the generations of matter particles. - Slides.

- 24th Sept 2019 Guest lecture given as part of *EBI3085* at the University of Malta on Entrepreneurship.
- 12 - 14th Sept 2019 Attended QISKIT Camp 2019 at Schilthorn and formed part of Team Quantum Rendezvous with Almudena Carrera Vazquez as coach. Presented results on behalf of Team. - Slides
- 9-12th Sept 2019 Attended *Quantum Information for Developers 2019* a quantum computing summer school and hackathon held at and organised by ETH Zürich.
- 12th April 2019 Delivered talk at the 2019 *S³ Annual Science Conference* entitled "*Can stitching up Spacetime differently give different Quantum Mechanics*". - Slides.
- 12th October 2018 People's Choice Award winning pitch delivered on behalf of LearnD at the Malta Innovation Summit.
- 9th October 2018 Guest lecture given as part of *EBI3085* at the University of Malta on Entrepreneurship.
- 11-14th Sept 2018 Attended *Quantum Information for Developers 2018* a quantum computing summer school and hackathon held at and organised by ETH Zürich.

Programming Languages

- Basic JAVASCRIPT, REACT.JS
- Intermediate HTML, CSS, Linux
- Advanced PYTHON, L^AT_EX

Quantum Computing Frameworks

- basic Project Q, Q#
- Intermediate Cirq
- Advanced QISKIT, QASM

Natural Languages

- English **Mothertongue**
- Maltese **Mothertongue**
- French **Intermediate**
- Italian **Basic**

Conversationally fluent
Basic words and phrases only

Interests



Malta Mathematical Society In an effort to kindle a sense of community amongst the students in the Departments of Mathematics and Physics, some friends and I reinstated the Malta Mathematical Society and have been hosting biweekly talks since the start of this academic year. The talks vary from number theory, applied mathematics to how to study effectively.

Science Communication For two years now I have had the opportunity to visit schools with other undergraduates and try to communicate why we love Physics so much and what it really is about. In these settings I typically talk to students about where the colours of objects come from and use this as a spring board to then get them to think about why the sky is blue. Upcoming initiatives for this semester include

- Wrote an article entitled "*What is Quantum?*" for the Times of Malta. To be published November 17th. You read the draft [here](#).
- Upcoming talk at Malta's National Science Center, Esplora during the *Superheros in Science* weekend about "Quantum Mechanics and Superheros".

Brazilian Jiu Jitsu This year I started practicing this grappling sport and am currently a measly white belt.

Scouting I was an active member of the Cospicua Scouts Group from 2010-2015, even having the privilege of being chairman of the venture scouts unit for the year 2014.

Guitar I have been playing guitar for 10 years and am avid listener of music. From Bach's Solo Cello Concerto to the Japanese progressive rock band Toe, I have a varied taste.

Additional Information

Date & Place of Birth 5th March 1999, Pieta, Malta.

Nationality Maltese (EU Passport).

START UP by Gail Sant

#GetLearnD



Students tutoring students

According to MATSEC, two in every three 18-year-old students don't make it from sixth form to university. **Gail Sant** speaks to the team behind **LearnD** to find out more about their take on student-centred education.

You love films, videos, and photos. You relax while watching Netflix, and learn new skills on platforms like Skillshare and YouTube. Me? I adore the written word. Books, magazines, blogs are all I need to live a happy life. People are unique. And we all learn things in a unique way.

Different people require different teaching methods to learn. But most classroom set-ups involve one teacher, one lesson, and thirty-odd students. The lesson is interpreted in thirty different ways; a few absorb more than others, leaving some in need of extra help to ace their maths test. And how do they do that? With private lessons.

In Malta, private lessons are the go-to solution for students struggling with a subject. However, these sessions tend to be a carbon copy of school classes: one tutor, one lesson, multiple students. This problem was the seed that gave rise to the education-focused startup LearnD.

THE PHILOSOPHY

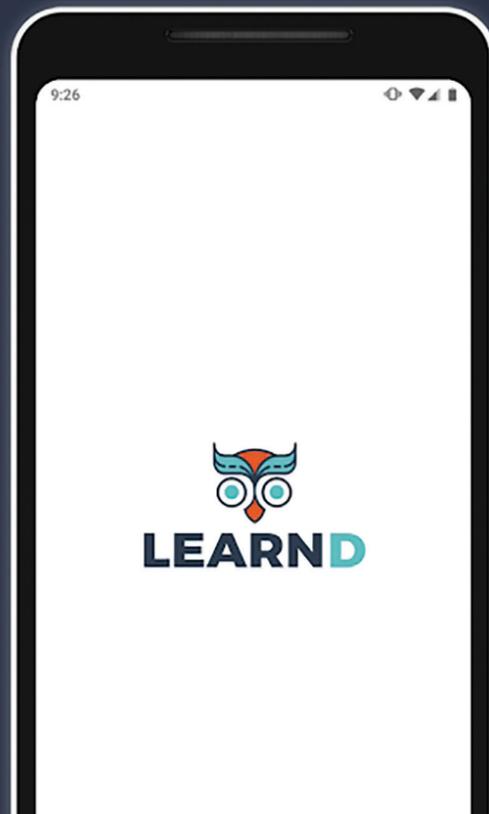
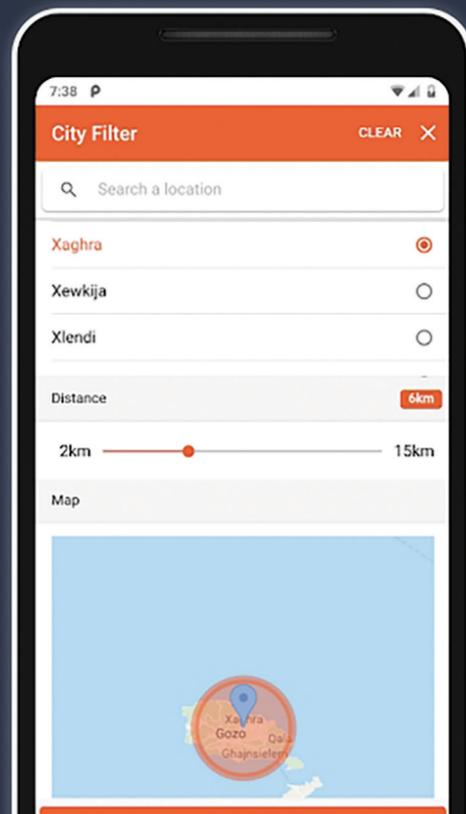
LearnD is a tutoring app invented by Luke Collins, Jake Xuereb, and Dr Jean-Paul Ebejer (Centre for Molecular Medicine and Biobanking, University of Malta). The concept behind it is simple, Ebejer says; 'it's

a bridge between students who can act as mentors and students who need the help.'

LearnD does away with the one-size-fits-all standard of teaching and offers students tailor-made tutoring. Individuals are treated as such, their problems tackled through dedicated sessions. As a student, you don't need to sit through a whole syllabus of private lessons. The point is to identify your weak points and hone in on them in select sessions. This is both time and money-efficient.

Xuereb believes 'private lessons can make students lazy.' They don't need to evaluate their problems, or focus on where their issues lie. Not when they know they'll just cover all the topics at various points during their weekly appointment with their second teacher on Tuesday night. LearnD focuses on dividing attention unequally. If you get an easy A in physical chemistry but struggle to pass organic chemistry, it only makes sense to give the latter some extra TLC. To get to this point, students need to take a step back from their desks and separate their strengths from their weaknesses.

This is also a big plus for tutors who don't want to (or can't) commit to teaching a whole syllabus. They can simply prepare a lesson for the requested topic and leave it at that, earning some extra money to accompany their stipend while gaining teaching experience. ▶



Prof. Russell Smith holding his invention: The Enterprise Framework, that can assess the health of any business
Photo by James Moffett

Prof. Russell Smith holding his invention: The Enterprise Framework, that can assess the health of any business
Photo by James Moffett



'Through LearnD you can find people who have been through the exact same thing and who can offer their best advice on anything from time management to de-stressing, and everything else.'



But LearnD isn't just about academia. Some lecturers lose touch with 'the student life', distancing their relationship with students. Conversely, student-tutors know the struggles a peer would be going through and can provide support. 'No one would have a better understanding of what a sixth former needs to do to get into medicine than a medicine student', says Xuereb. 'Through LearnD you can find people who have been through the exact same thing and who can offer their best advice on anything from time management to de-stressing, and everything else.'

MAKING IT HAPPEN

The original concept was more related to finding a way for academically inclined 6th form students to contribute productively to society,' says Xuereb. When he spoke to Collins, a fellow University of Malta student and Xuereb's former maths tutor, the idea went from 'an online local network' to 'app'. At the time, there were no local tutoring apps.

Despite both being passionate about the idea, they soon realised that they needed someone with business experience, and that's where Ebejer came in: the LearnD team was born!

The process that made this idea into reality was not a simple one.

Xuereb and Collins spent over six months working on the app, learning about the tech behind app-making and coming up with a business plan.

They got their break when they won the Take-Off Seed Fund award in 2018 and got the necessary funds to make the app a reality. They quickly got the ball rolling, hiring designers, app developers, and marketing agents. The team grew; the app was built. Then, during the KSU Freshers' Week in 2018, the app was partially launched, inviting potential tutors to apply. The app is now fully launched and available for students.

TROUBLES

As with all big projects, the team ran into a few setbacks along the way. One prominent techy mishap didn't allow them to launch the app on the Apple Store, making it difficult to keep up with the launch date.

Since the app is used by underage students, there were also a lot of safety features which needed inclusion. Tutors upload their police conducts and ID cards. Also, to make sure LearnD's service is reliable, the team not only analyses tutors' qualifications, but they also try and test each applicant out themselves. And for accounts which belong to students under the age of 16, parents

need to authorise any communication which goes on through the app.

The team persisted through the struggles they encountered and continue to work hard to solve any problems which crop up. Despite difficulties with time management, Collins and Xuereb, both undergraduate students, expressed how this app allowed them to dive into the working world. They gained entrepreneurial maturity, understanding the importance of a reliable team which shares the same ideas and work ethic, as well as dividing funds for the project's overall benefit.'

A LEARN'D FUTURE

The LearnD story doesn't stop here. 'We want to renovate the education space,' says Ebejer, adding that they wish to take the next step and make it internationally available. Malta's size makes it the perfect test bed, but they think that the app shouldn't be limited to its home.

According to MATSEC, in 2017 only 27% of 18-year-old students acquired the necessary qualifications to get into university. Collins expressed that students 'shouldn't get lost' because of a bad exam result or because of a mismatched student-teacher scenario. Students deserve to be treated as individuals, and LearnD can offer them that. 