

Australia (Victoria)
John Monash Science School
Supplementary Information

ANNEX 1. UPDATE. ORGANIZATION OF LEARNING AND CURRICULUM

The physical learning environment, as well as different ICT tools, comes together in an effective way as part of the learning process. This well-planned and ambitious ILE has the support of Monash University in terms of facilities and research on innovative learning. We consider this case of great interest, but there are some questions on which we would like you to clarify some issues:

1. About the actual learning process: How do students learn and study as a day-to-day matter? Do they have to attend lessons or seminars? Do individualized learning pathways involve constant individual work? In those “small learning groups” does peer-to-peer teaching take place?

Students follow a program of studies different from any other school. Whilst some studies such as Mathematics and English are taught as discrete disciplines, others such as Issues and Creative Studies, both unique to JMSS, are the genuine integration of a number of learning areas. However the major point of difference is that all studies are taught using a team-based approach, and this allows students many different opportunities and methodologies in which to learn.

As an illustration, the semester-based study ‘Marine Biology’ (one of several offered at JMSS) had 50 students and two teachers who worked together in an open flexible laboratory space in semester one this year. In this environment each student had a tablet computer with access to a range of software, internet-based resources and interactive media. The students undertook many investigations in teams, with each contributing to the overall learning of the group. They also attend seminars with university experts, often undertaking practical investigations such as the dissection of Elephant Sharks. A similar approach takes place in Core Science, where students have the opportunity to study the founding principles of science as well as undertake investigations in teams.

Mathematics and English classes work in a similar way, with multiple groupings. Teachers use a range of pedagogies to enhance learning, from explicit instruction, to differentiated groupings, to team-based approaches to open-ended problem solving or investigations.

Issues Studies is a project-based study interfacing the sciences and the humanities with a global perspective. Student groupings occur in either 3 classes (75 students) with 3 teachers or 2 classes with 2 teachers. The students have worked on whole class projects, for example Haiti, which was used as a case study of environmental and economic effects on population growth, as well as individual projects focussing on the broad theme of sustainability. These varied from ‘Should Australia Invest in Nuclear Energy?’ to ‘The Effect of Climate Change on the Great Barrier Reef’. The standard of work was incredibly high. Students support one another in this work, and are encouraged to do so. They follow a routine of regular checks with teachers who move through the space and guide students in their research. We ensure we have a range of skill sets in the teaching team, so themes in Geography, History, Politics, Science, Philosophy, Environmental Science and Mathematics.

Creative Studies is again a team-taught study with the students undertaking a range of team-based or individualised projects in Computer Science, including robotics, web design, animation, simulation, engineering and thinking machines.

All of these courses of study have been co-designed with experts in their field from Monash University. They are frequent visitors to the school and often join the teams in the delivery of the curriculum. It is a wonderful partnership where both teachers and university academics are learning from each other in an intellectually stimulating environment. The outcomes including assessment initiatives have been innovative and of an extremely high standard.

Our students planned and conducted their own Nanotechnology Conference, presenting the findings of their research projects to Monash academics, and the Astronomy students completed academic posters on their projects, and hosted an information night on their findings for parents and academics. These opportunities highlight how the mission of the school has been embraced by students, parents and Monash researchers – it has been inspirational to witness.

Another major innovation in learning is the pervasive use of information and communication technologies in all studies, and in the school's administrative and communication systems. The school uses google apps almost exclusively to create and store curriculum, and students are able to access all the resources they need from the google site posted for each course of study. Teachers also use this medium to collaborate with each other in the creation of curriculum, and also with students in formal assessment work, provision of advice and support at any time, provision of ready feedback on student ideas, drafts and questions, and of course provision of a wide range of e-resources. The school's administration uses google apps and the Compass application to streamline many of its processes, communicate with students and with staff, get feedback from members of the community on a range of issues and monitor student attendance and progress. These initiatives are leading to a paperless environment at JMSS, and one in which digital communication is enhancing student learning as well as administrative processes.

Each student has an individual learning plan which supports them on their learning journey. They have a personal staff tutor to assist them with this. In the plan they identify their preferred learning styles, their strengths as learners and areas for improvement, and set their short, medium and long term goals. They develop strategies to achieve the targets set for improvement. They also map out their future pathway to ensure the courses of study they choose will help them achieve their goals. All students are supported on their learning journey by their tutors and the House structure which is in place. Each of the four Houses have four tutor groups in 2010. This helps develop connectedness between students and teachers, and ensures that strong relationships between teachers and students develop. No student is alone on this journey!

2. About the curriculum: Is there innovation in the curriculum as well? (e.g. cross- subject activities...) If so, what makes the JMSS's curriculum different from others?

The previous section should have highlighted for you the innovation in curriculum at JMSS. Whilst each student follows a similar program in their founding year at the school, there is a large scope for individual choice within the curriculum as much of it is project-based. Students are taught the core skills in research, self-management and collaboration so that they are able to follow a project of genuine interest to them and be confident they can complete it to a high standard.

All students study Enrichment Science, a series of semester-based units not available in other schools. These include Nanotechnology, Marine Biology, Astronomy ('From Quarks to Quasars'), geosciences ('From Ice to Fire'), Biomedical Science as well as VCE (Victorian Certificate of Education) units in Biology and Physics. Palaeontology, Pharmacology, Agricultural Science, Climate Science and Studies in Engineering are all planned for the near future.

Creative Studies and Issues studies, core components of each student's program in their first year at JMSS and as stated previously unique to this school, are integrated studies where students are taught the key skills of Computer Science and Humanities respectively, but are given the opportunity to develop these in projects of their choosing. Issues Studies in particular teaches students to examine issues of world significance through a range of lenses, including scientific, social, ethical, political, historical and economic. We feel the skills gained in these studies to be fundamentally important in preparing the 'scientists of tomorrow'. It integrates the study of Science with core concepts in Geography, History and Economics.

Another important dimension to our curriculum is that of Leadership. It is one of the two core components of the Personal Learning Program, the other being 'Learn To Learn', in which students come to know themselves as learners, their preferred learning styles, and skills in how to research, revise, cope with pressure, manage

time, prioritise and prepare for exams. In the Leadership component, students explore both its dimensions and its effect on others.

They come to understand their own potential as leaders and the need for them to act ethically, responsibly, courageously and with humility if they are to make well-balanced and considered decisions in the future. The course also contains Physical Education as the school strongly believes in a good balance between physical activity and academic study.

Students can put these skills into practice in JMSS's Student Parliament, comprising House Captains and elected representatives onto a range of committees such as the Environment Group, Performing Arts Group, Media and Communications Group and Community Services Group, among others. This forum gives the students a strong voice at the school and has seen a range of House-based activities, competitions and charity fund-raisers organised. The Parliament is also a forum in which to discuss matters of learning, and how we as teachers can continue to work together with the students to provide quality in teaching, curriculum and support. It also gives the students a place in which to have input into what they can do to ensure JMSS is a place where everyone can contribute in a safe and supportive atmosphere.

The school's Co-curricular program is also extensive and different to that in other schools. All students participate in the program each Wednesday afternoon. We have 16 Languages being studied then, some in classes taken by teachers from the Victorian School of Languages, and others by Distance Education Victoria. Almost half of our students are involved in music, with many ensembles and bands playing together. Drama, Art and Sport also feature prominently, and the school is pleased to have the support of many undergraduate students and pre-service teachers who willingly coach and mentor our students in these activities. While this program is running, our staff are involved in three hours of professional learning and curriculum development. This weekly contribution to their learning and time for planning is relished by teachers who rarely get the opportunity to work in their teams for such an extended period of time in other schools.