The Proscope Digital USB Microscope.

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Educational Needs:

The students need to have experience with microscopy as part of the development of scientific understanding. In today's world it is increasingly important that they have the ability to integrate a variety of technologies into the learning process, both for developing understanding of the world around them, and as a tool for presentation and saving of work. The Proscope gives students the ability to combine the best of microscopy with the ability to save what is seen in an electronic form, whether as a movie file or a picture file. Students may use Proscope for observation of organisms or substances at a microscopic level, save their observations for later reference and incorporate their saved files into presentation of work, whether in the form of research assignment or delivery to their peers. top

Learning outcomes

Proscope will help students to learn with relation to the following Achievement Outcomes (from Science in the New Zealand Curriculum) This list is by no means exhaustive.

Strand of the Science Curriculum	Achievement Outcomes	Suggested learning activities
Making Sense of the Living World, levels 4-6	• Investigate and describe special features of animals or plants which help survival into the next generation; • Investigate and describe patterns in the variability of a visible physical feature found within a species, *e.g., coat colour in cats, feather colour in budgerigars, human fingerprints, leaf shape and colour;* • Investigate, and classify in broad terms, the living world at a microscopic level, *e.g., protists, plant and animal cells;* • Investigate and describe structural, physiological, and behavioural adaptations which ensure the survival of animals and flowering plants in their environment, *e.g., the organ systems which animals use to locate, catch (or harvest), eat, digest, transport, and use food; territoriality; social behaviour; photosynthesis; osmosis; transpiration;* • Investigate and describe examples of different types of helpful harmful micro-organisms, *e.g., bacteria, fungi, viruses and diseases HIV/AIDS or leukaemia, bacteria and fungi in biotechnology;*	• Observe closely the structure of plants. • Make a time lapse movie of different seed release mechanisms. • Use yeast to make ginger beer, and examine the live yeast culture with Proscope. Observe cell replication. • Use Proscope to look at different adaptations of small organisms (eg slater), and describe how these adaptations help the animal to survive. Use saved picture files to prepare a report. • Use Proscope to locate the nucleus in plant and animal cells;
Making Sense of the Material World, levels 4-6	• Investigate and explain how uses of everyday materials are related to their physical and simple chemical properties, *e.g., fabrics, metals, plastics, household substances;* • Distinguish between	• Examine different materials microscopically to compare structure and relate this to their use.(eg plastics, paper, fibres) • Use Proscope to determine the physical properties of different

	elements, compounds, and mixtures, using simple chemical and physical properties, and describe a simple model of the atom;	types of chemical substances. • Closely observe chemical reactions on a macroscopic scale, for example the reaction of carbonates with dilute acid. • Observe the effect of using catalysts on chemical reactions.
Making Sense of the Physical World, levels 4-6	• Investigate and offer explanations for commonly experienced physical phenomena and compare their ideas with scientific ideas, *e.g., sound notes and tones, light and lenses, colours, electric current, condensation, force, speed;*	• Examine different coloured printed inks to see what individual colours are combined to make the colour we see.
Making Sense of Planet Earth and Beyond, levels 4-6	• Collect and use evidence from landforms, rocks, fossils, and library research to describe the geological history of the local area; • Investigate and describe processes which change the Earth's surface over time at local and global levels, *e.g., erosion, weathering, earthquakes, volcanoes, continental drift, plate tectonics;* • Investigate and classify some common minerals and rocks according to their easily observed properties and relate to their common use, *e.g., calcite, feldspar, quartz, sulphur, magnetite; gemstones, building materials, road aggregates, use in industry;*	• Examine the crystal size and shape in different rocks • Use Proscope on time delay setting to observe formation of large crystals and small crystals, relating crystal size in igneous rocks to the method of formation. • Examine samples of rocks or minerals, using common features such as colour and texture, • to practise their skills of classification. Prepare a key using saved picture files. • Examine the appearance and structure of fossils in rocks, to determine what kind of environment the organisms lived in. • Examine the size, shape and texture of different substrates, to determine the kind of weathering that has taken place and rock origins.

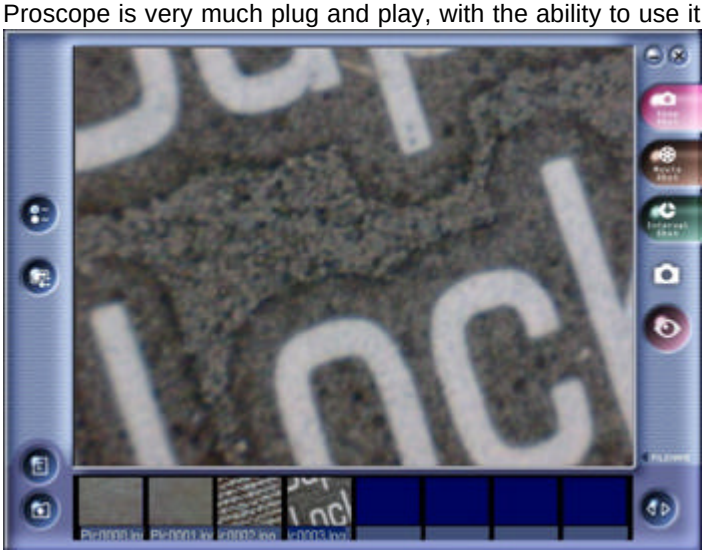
Criteria against which the application will be evaluated

- Ease of use – mechanical. By this I mean how easy the actual Proscope is to set up for a particular learning activity, incuding demonstration to students and skills required to use Proscope.
- Ease of use – accessibility. By this I mean how easy it is to book Proscope and how easy it is to also be in a situation where students may carry out their investigations, with access to the required computers.
- Integration with existing technology (light transmitting microscopes)
- Ability to be widely used across the science department
- Cost effectivity top

Evaluation

At present, this is the only digital microscope available to schools in New Zealand. I have seen others, in Australia, but the cost of import and currency exchange is prohibitive. Proscope is small, light and extremely portable. There are a number of accessories including a very strong carrycase. Proscope is able to be used with existing school microscopes, with the addition of a "C mount adaptor". This means that students are able to use the larger number of school microscopes to prepare and examine slides and then take turns using proscope to electronically record their work. The issue at stake is largely one of whether the cost of acquiring one or more Proscope is justified by the evaluation against the previously stated criteria.

Ease of use – mechanical. Proscope is extremely simple to operate. One USB cable plugs into the computer, where it draws its power. As long as the accompanying software package is installed, Proscope is instantly available to use. Requirements for installation are: PC- Win 98, 98 SE (Windows systems require DirectX 8.0 or greater, available as a free download from Microsoft), 2000, ME and XP (drivers for XP are a free download on the Proscope site). MAC- OS 8.6, 9.0, 9.1, 9.2 (ship with The ProScope™) and OS X (a free download on the Proscope site). 32mb ram with 64mb recommended, 200 MHZ processor and 2GB HD space. Once installed, Proscope is very much plug and play, with the ability to use it like a still or video camera.



Ease of use – accessibility. All science staff are able to book the science computer pod. It is preferable to have students saving their files on to a laptop, in class, however, and this being transferred to each student's network folder by email. For investigations which may be wet this is safer than transporting the equipment to the pod. Space is an issue here. All science staff have access to a bookable laptop, which would make this process easier.

Integration with existing technology (light transmitting microscopes). The science department has a large number of existing microscopes. It is important for students to recognise that this "new" technology does not supercede the more "traditional" technologies in existence, but complement them. Having the ability to use both together is good on two counts. If the decision is made to only purchase one or two Proscopes,, then all students have access to microscopes while they are waiting their turn to record data electronically.

Ability to be widely used across the science department. The table integrating Achievement Objectives with learning activities shows that this is a ubiquitous tool. There are also many uses for Proscope in the senior sciences, particularly in Biology.

Recommendations

Bearing in mind the relatively high cost for one basic kit, my recommendation would be to purchase one Proscope kit for the science department. I feel that it is too expensive to justify more than one, but the benefits to students in achieving their learning outcomes do make it a worthwhile purchase. It is an example of how technology and science are closely related, an important integrating strand in the Science curriculum. All Science staff will need Professional Development on use of the Proscope, which will be integrated in to departmental meeting time during term four. Once the software is installed, the technical issues are virtually nil, and it becomes a matter of incorporating Proscope as a tool into the planning of learning activities. top

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top