THE SCHOOL OF FOOD

DR CHRISTIAN NANSEN REIMAGINES THE SCHOOL CURRICULUM AND PLACES FOOD AT THE CENTRE OF ALL SUBJECTS, FROM CHEMISTRY TO HISTORY AND MATHS

Imagine an entire school curriculum rooted in a single denominator: food. Biology, ecology and environmental science being taught based on projects related to the growth of plants and animals. Literature, history, sociology and humanities focusing on the importance of food and concepts, like 'breaking bread', feasts and banquets. Just think of how explorations by Vikings, Columbus, Marco Polo, etc. were largely driven by trade in spices, tea, sugar, coffee, silk and cotton.

What I am proposing here is already being done, in part, as individual initiatives and projects. For example, many schools have a butterfly garden, biology labs keep colonies of insects, students grow some vegetables and have a few livestock animals. In some schools, students learn how to eat and cook healthy food. But I am proposing a full commitment to 'food' as the underlying driver of an educational curriculum. And I am arguing that such a focus on food would strengthen, not weaken, the academic rigour that could be delivered to students of all age groups.

That is, 'food' as an educational denominator can be taught and approached with multiple goals in mind, and these would be similar to the current distinctions between practical and more theoretical classes.

With the best of intentions, middle and high school curricula seek to provide students with essential skill sets regarding problem solving, critical thinking and basic knowledge. It is undeniably important to acquire basic mathematical skills, understand the fundamentals of genetics and biology, memorise and study principles of physics and chemistry, have a basic understanding of main historic events and of civilisations through time, appreciate and understand classic literature, and understand sociological drivers and their role throughout history. In a world with rapid growth in the adoption of technologies, students also need to learn about computer programming and robotics. I agree that all of these topics must be part of school curricula. I would argue, however, that they can all be taught very effectively through an underlying emphasis on food.

LIFE SCIENCES

Students of all ages can grow crop plants in small pots inside a classroom, or outside, in small plots (such as a roof garden) and study growth as a function of time and growing conditions. Concepts of 'abiotic' (i.e. temperature, humidity, wind, sunlight, soil pH, 'micro-nutrients' and 'macro-nutrients') and 'biotic' (pests, pollinators, microbial symbionts) variables can be introduced to explain specific crop growth patterns and plants' basic physiology. Through lectures about basic soil characteristics, the students can learn about pH levels, the physical properties of minerals, and about ecosystem services by soil microbial organisms. The importance of water could be another sub-topic – the basic functions of water in the growth of living organisms. Practical tasks associated with this discipline could be to design/develop a crop production system and calculate: 1) the number of plants per area (how many seeds or transplants are needed based on row and plant spacing); 2) irrigation and fertiliser requirements; and 3) yield (both amount and value).

More advanced practical tasks could involve: 1) development of irrigation systems (potentially automated and programmed using raspberry pie computing); 2) use of sensors (i.e. soil moisture sensors and/or weather stations to monitor growing conditions and later describe/explain crop yields.

Agricultural plants (and animals) are direct results of selective breeding. Basic genetics could be explained through a series of classes on how humans produce cabbage, broccoli, cauliflower, kale, Brussels sprouts, etc. from wild mustard plants. Such classes could start with the observations from Darwin, Mendel and others, or they could introduce crop breeding programmes from ancient Mesopotamia. These subjects would be the building blocks for basic concepts in genetics and molecular biology. Fundamentals in cell biology could be observed through plant cells, enabling students to make important connections between cell organelles, plant physiology and crop development.

ENGINEERING, COMPUTER SCIENCES AND FOOD PRODUCTION

Each school could carefully examine its own potential for having solar panels to produce energy, install rainwater catchment systems and water recycling methods, and identify sources of organic material for composting (crop fertiliser) from within the school and/or nearby shops, factories, etc. Engineering, computer science and technology would be taught as projects that focus on how to quantify, develop quality control, and use energy, water and nutrients in on-school crop production. At a more advanced level, it would be possible to integrate robotics and machine learning systems into the curriculum. If food production is not feasible on the school premises, then students could develop virtual computer programmes and simulate real-food productions.

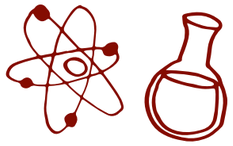
HUMAN HISTORY

Around 1845, the migration by people in northern Europe to North America was largely due to famine, which was caused by a devastating disease in potatoes. History and social sciences could be taught on the basis of the importance of food through time and among cultures. What did the Mayas eat and why? How did trade routes and commerce (coffee, sugar, spices and silk) affect societies and civilisations? It would be incomplete to discuss the history of the southern US states and slavery without taking a careful look at the commercial role and industries derived from sugar and cotton plantations.

CHEMISTRY

Cooking is nothing more and nothing less than applied chemistry. How does the pickling of vegetables work? What is happening when cream is whipped? What happens to food during heating and/or frying? Salting olives, fish and other types of meat has been practised for thousands of years – how does this means of preserving food actually work?

Imagine teaching students about chemical reactions and chemical bonds, pH levels and other basic chemistry concepts through a combination of theory and eating food! Students would surely walk away with a profound appreciation for food and hands-on cooking experience. Indeed, learning about organic chemistry, food preservation and cooking would also address nutrition and the importance of healthy eating.



HUMANITIES

Food is mentioned in literature in myriad ways. It is a part of rituals and traditions that define our cultural values. In all societies and cultures, large banquets and feasts play roles in celebrating major events of celebration. They invoke a sense of victory and power; they enforce images of superiority, but they are also unifying and crucial in diplomacy and reconciliation. In paintings and poetry, symbolism based on food items is common. Just as one can study an individual genre of art, I would argue that, for instance, one can compare how Renaissance painters and Andy Warhol used food items in their paintings.

SOCIAL STUDIES

Concerns about food security are linked to the effects of climate change and to international crises. More specifically, climate change and water scarcity, and therefore food security, are factors underpinning conflicts in the Middle East and elsewhere. Thus, long-term solutions to these crises cannot be conceptualised unless they include considerations related to sustainable food production.

Another topic to address is urban farming and 'edible cities'. It is the traditional notion that rural and urban developments are in direct conflict with one another, as the growth of cities take up farmland and water resources. But urban farming and edible cities are about the partial integration of the two, about creating urban environments with high degrees of recycling of resources (water and nutrients) and urban citizens producing some fraction of their food consumption.

MATHS

Mathematics could be taught through models of crop and animal growth (as functions of nutrients, weather, pollination, pest pressures, etc.) and the economics of food trade. Imagine enabling students to access data from an on-site weather station (perhaps from one they have built and programmed themselves!) and assigning them the task of using temperature data to model and predict the growth and harvest time of vegetables in the school's vegetable garden. Such a task could easily involve differential equations and lead to the creation of urban maps of yield potentials. Students would likely be far more inclined to embrace learning about differential equations as important/meaningful, because it is being presented to them in a tangible and relevant context.

Moreover, individual schools, or a group of schools within an area, could have practical or theoretical contests, in which student groups compete to develop the most accurate model. Many schools already have robotics programmes, and there are competitions at multiple levels for students to showcase their skills. How about similar competitions for sustainable urban food production?

PHYSICAL EDUCATION

Even physical education could be brought under this food umbrella. The practical aspects of gardening and animal husbandry (i.e. looking after chickens or rabbits) involve physical labour. Look at the commercial role and industries derived from sugar and cotton plantations.

Example of a large roof garden on a large school in Hangzhou, China.

FOOD AS A DENOMINATOR

We all need food, and it is something all students can directly relate to. But what we eat has changed over time, and it varies among countries and cultures, meaning that not all students view food in the same way. Teachers can capitalise on such diversity in food experience among students in a classroom and use it as a conduit to bring students together. Music could be another denominator, and I am sure there are many others with equally broad relevance and potential. Food is highlighted because it relates so clearly to our growth and well-being; it is very easy to structure and execute teaching curricula around food, both practically and theoretically.

As an educational denominator, food can be used to indirectly address societal challenges, such as obesity, and it can also elevate levels of empowerment. That is, I think many young people suffer from stress induced by fears about the consequences of climate change and from a sense of being powerless and unable to make concrete contributions to a more sustainable future. Learning, both in practical and theoretical terms, about sustainable food production could be a strong catalyst of empowerment, and it may also provide the context that makes more students interested in basic sciences and entrepreneurship.

We all know the saying, "You are what you eat". How about using what we eat, food, as the denominator in our school curricula?

Examples of students collecting data as part of experimental research on food and food production.