CUREE summary of Jerome Bruner's work in relation to the curriculum for the 21st Century Curriculum: Building the Evidence Base project.

How can ideas from the past about the curriculum help us make effective changes today?

Sometimes, when we encounter a change in teaching, such as a change of policy or a new strategy from CPD, we may be tempted to think we are simply returning full circle to ways we used to do things. But the experiences gained in the intervening years are a valuable part of the process of change. Working from a new starting point helps us to move earlier thinking further along. This is not just a case of recycling. Revisiting the ideas Jerome Bruner put forward about the curriculum nearly half a century ago demonstrates this well. They take on a new meaning when we consider them alongside recent developments such as assessment for learning and thinking skills.

What did Bruner propose?

Bruner argued that curriculum planning should work in a spiral

Bruner believed that the curriculum should continually revisit basic ideas, building upon them incrementally and making links and connections between them until the pupil has grasped full understanding – a spiral curriculum that links ideas and thinking skills incrementally over time.

Where should we start?

Bruner proposed that the starting point of learning should be what learners know, believe and can do already

He said, 'Any subject can be taught effectively in some intellectually honest form to any child at any stage of development'. He recognised that this suggestion might seem startling at first sight, but he was keen to highlight an essential point, often overlooked in curriculum planning, that 'schools may be wasting precious years by postponing the teaching of many important subjects on the grounds that they are too difficult'. No, he wasn't suggesting teaching astrophysics to pre-school children. Rather, he argued that pre-school children might intuitively learn some physics principles such as force, mass, momentum and friction through playing with toy vehicles etc. and that an effective curriculum would plan to take account of and build on such experiences. Bruner's notion of the importance of play – 'learning by doing' – for building understanding is just as relevant to, and important for older learners, as it is for early years children.

Building on students' current knowledge and understanding helps to make the connections between earlier and later learning clear

With a spiral approach to curriculum planning, earlier learning can be used to make later learning easier by providing a general picture in which connections between the things encountered earlier and later are made clear. For example, a young child may simply recognise a certain shape as being a square. Later he or she will refine this knowledge and come to know that all the sides are equal and all the angles 90 degrees.

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Why should and how can we develop children's intuitive thinking?

Experts often start from an intuitive hunch, then set out to prove or disprove it

It was more important to Bruner for pupils to have an intuitive grasp of a subject – the ability to say how it goes, than to know the proper terms or standard formulae, but not understand their meaning. He pointed out how experts frequently appear 'to leap intuitively into a decision or to a solution to a problem' – with little awareness of the process by which they reached their answer. Afterwards they decide the rightness or wrongness of an intuition, through the usual methods of proof.

Teachers can encourage intuitive thinking through modelling it themselves, and encouraging pupils to guess, whilst making pupils feel safe about making mistakes

Bruner suggested that pupils are more likely to develop intuitive thinking if they see their teachers thinking intuitively. A teacher who shows a willingness to guess at answers to questions asked by a class and then subject the guesses to critical analysis is more likely to build those habits for students, than teachers who analyse everything for the class in advance. He also thought teachers could help pupils to learn to think intuitively by encouraging them to guess. Cultivating intuitive thinking does require teachers to build pupils' self-confidence. A person who thinks intuitively runs the risk of being proved wrong. Such thinking therefore requires a willingness to make mistakes – someone who lacks confidence may be unwilling to run such risks. Of course, building self-confidence is not always easy, but providing sensitive, flexible support will help.

How can we help move pupils' learning on?

Teachers can accelerate pupils' development through giving them challenging (but not too challenging) problems to think about

Bruner suggested that teaching does not have to follow children's natural cognitive development, but can lead it by providing challenging, usable opportunities that enable children to forge ahead – by tempting them into more powerful modes of thinking. His idea was to match a problem to learner's capacities or find some aspect of the problem that could be matched and using that match to move learners on from their current developmental level.

Teachers need to take care to build on pupils' own methods and ideas rather than impose an approach

Providing an appropriate next step – a classroom example

In this example, a class of twelve year old students worked on a geography mystery in groups. With a mystery activity, groups are given 15-30 pieces of information related to a question. The students are expected to use as much of the information as they can to answer the question. Not all the information is necessarily relevant.

The teacher noticed that a group of low achieving boys was having great difficulty with a mystery concerning the disappearance of a tribe of Amazonian Indians. She visited them and pulled out a data item about the tribe's water supply. She then asked them to find any other data items about water and left them to work alone. With this action, the teacher had diagnosed a weakness shared by the whole group in classifying/grouping data and demonstrated how they could undertake the next stage in working towards a solution. When the pupils had grouped several data items about water, the teacher returned to suggest that they might form a group about diseases and health. This enabled her on a third visit to start asking them about the possible connections both within and between the two groups of data items. The pupils thus took their first steps towards formulating an explanation.

Learning through enquiry – a classroom example

Bruner gave this example of a geography lesson he had observed that illustrated learning through enquiry. The children (who were aged 11-12 years) were introduced to the geography of an area by being asked to locate the major cities on a map that contained physical features and natural resources, but no place names. During a class discussion about the problem, the children produced a variety of plausible theories about the sorts of resources a city might need, which included the importance of water transportation, mineral resources and food supply. Consequently, they placed Chicago at the junction of three lakes, another city near the Mesabi range, and a third on the rich soil of Iowa. Bruner was particularly struck by the high level of interest shown by the children whilst working on this task. But of greater importance to Bruner was the children's attitude to learning. He commented on how for the first time, they saw the location of a city as a problem, and a problem they could discover the answer to through thinking about it.

Bruner emphasised the importance of presenting children with ideas that are not too far from their natural way of thinking. So, for example, whilst ten year olds can play mathematical games using rules modelled on highly advanced mathematics, and can arrive at the rules themselves inductively, they will flounder if they are expected to use a formal mathematical equation because they will apply the device without understanding it. This is why young children tend to experience more success when they solve mathematical problems using their own informal methods, than when they try to use formal mathematical equations. Teachers will help young pupils more by helping them to structure how they record their own informal methods than by teaching them how to use formal mathematical approaches.

Why did Bruner consider making connections within and between subjects so important?

Children may forget facts, but encouraging pupils to make connections will help them to work things out for themselves

Bruner argued that helping pupils habitually to make connections builds their skills in making active use of 'materials' (ideas and experiences) they have already come to understand. If in mathematics, for example, pupils learn how multiplication is commutative (i.e. that 2X3 and 3X2 give the same answer) but that subtraction isn't (i.e. that 3-2 does not give the same answer as 2-3), they can then apply the rules in different situations. Knowing key facts or the names for particular rules is of lesser importance. Bruner pointed out how scientists don't try to remember the distances traversed by falling objects in different gravitational fields over different periods of time. Rather, they use formulae that allow them to reconstruct the details.

Making connections enables transfer to take place

What was crucial in Bruner's view, was how learning to make connections enabled transfer to take place. As Bruner put it, 'students have only limited exposure to the materials they are to learn… this exposure [needs to be] made to count in their thinking for the rest of their lives'. Bruner saw two kinds of transfer: one consisting of learning a skill, the other consisting of learning a general idea that can be used as a basis for recognising subsequent problems as variations of the original idea.

How can we help pupils make connections?

Answer Children will learn to make connections through pursuing their own enquiries rather than through acquiring factual knowledge

Investigating history – a classroom example

Academic historians use an investigational approach that involves evaluating and interpreting fragmentary and sometimes contradictory evidence from a variety of sources. A teacher developed a week-long local history project for her class of 8-9 year olds in which the objective was to solve the mystery of the suspected murder of Samuel Whitehouse, who died in April 1822 by piecing together a variety of evidence. The children were encouraged to take on the role of history detectives – to think of questions, follow a line of enquiry and make hypotheses. At the end of the project they each wrote an account of the event.

For one of the activities, the classroom was rearranged to form a court of law. The children decided who could be asked to stand as witnesses (for example, the local blacksmith and publican) and chose children from the class to take on the roles. They also chose a child to be the judge. The other children were expected to take turns in cross questioning and interviewing the key witnesses to try to establish the truth of what happened to Samuel Whitehouse. The judge's role was to maintain 'order in court' when the questions came too quickly, and the jurors or the public became too excited. All the children were expected to ask questions and make notes. At the end of the session, the class discussed which questions caused the witnesses to reveal more evidence or detail.

Taking part in this activity helped the children to become more aware of bias and different interpretations of events. One child commented: 'It made me think that history is a mystery, that no-one knows what happened'. Another said, 'It changed my ideas about history because I now know that people from the past can lie as well as be truthful'.

Bruner suggested that we can help children learn by encouraging them to make connections and that we could do this by involving them more in the process of learning. The approach he advocated was children learning through personal discovery and enquiry rather than being passive receivers of information.

Bruner's beliefs about the value of learning through enquiry arose from his belief that intellectual activity is fundamentally the same for everyone, 'The schoolboy learning physics is a physicist and it is easier for him to learn physics behaving like a physicist than doing something else'. By 'something else', Bruner was referring to pupils using textbooks that present the conclusions of research rather than pursuing their own enquiries – that is, using an approach that emphasises the acquisition of factual knowledge rather than solving problems – the traditional approach.

Where did Bruner get his ideas about curriculum planning from?

In 1959, Bruner, a professor of psychology at Harvard University, was invited to chair a conference attended by 35 experts from the fields of science, psychology and education. The delegates spent ten days exploring conceptual questions about learning and teaching, such as what should be taught, when and how, and how subjects could be structured in ways that gave students a sense of the fundamental ideas as quickly as possible. Afterwards, Bruner wrote a report based on the views debated at the conference and the correspondence that followed it. The process of Education as it became known was published in 1960.

Bruner, J. S. (1960, revised edition 1977) The Process of Education, Harvard University Press

How could you act on this research?

You might like to work with your colleagues to identify a small number of core ideas in different subjects and to gather and discuss evidence of your pupils' developing skills and understanding about these ideas as they progress throughout the school? Can you identify areas where pupils already experience a spiral curriculum? Could you work with your colleagues to use the information you have gathered to extend spiral curriculum experiences for your school?

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