Spaced Learning

Key Conclusions
1. The spaced learning principle is based on relatively strong evidence and this pilot suggests that SMART Spaces has evidence of promise.
2. This pilot study demonstrated that SMART Spaces can feasibly be delivered in English schools. Both teachers and pupils appeared to enjoy and engage with the programme.
3. Teachers generally reported that they delivered SMART Spaces lessons as prescribed and did not make major alterations.
4. The small randomised controlled trial (RCT) provided some preliminary evidence that the most promising approach to spaced learning combines the use of both ten-minute and 24-hour spaces between curriculum content. However, this was a small study and a larger trial is needed to better understand the impact of the programme.
5. SMART Spaces is ready for a larger RCT to evaluate its impact on GCSE attainment.

What is the impact?
The principle of spaced learning is supported by evidence from two scientific fields, neuroscience and cognitive psychology. The neuroscience literature supports the use of shorter spaces between learning (of around ten minutes), and the cognitive psychology literature supports longer spaces (of around 24 hours). This study used a small randomised controlled trial to investigate the efficacy of three different versions of the SMART Spaces programme. The study suggested that the version which combined 24-hour and ten-minute spacing appeared to be the most promising variant. This version was also supported by both the neuroscientific and cognitive psychology literature, and will be used in future implementations of SMART Spaces. However, this study was only intended to provide preliminary evidence and is smaller than EEF efficacy trials. A larger trial is required before any firm conclusions can be drawn about the efficacy of SMART Spaces.

By the end of this developmental pilot, HTSA had developed SMART Spaces into a programme that could feasibly be delivered in English schools. Both teachers and pupils gave substantial positive feedback about the programme. Most teachers did not feel they needed much further support to deliver the intervention, which suggests the training was successful. Teachers generally reported that they delivered SMART Spaces lessons as prescribed and did not make major alterations. The programme is ready for a larger trial; it is clearly defined and could be delivered to the large number of schools required in an efficacy trial. The evaluator estimated that the programme would cost schools £10 per pupil in the first year of delivery, a very low cost. Schools will also need to arrange one full day of cover, and this might result in further costs.
<table>
<thead>
<tr>
<th>Question</th>
<th>Finding</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there evidence to support the theory of change?</td>
<td>Yes</td>
<td>The spaced learning principle is supported by evidence from both the cognitive science and neuroscience literature. The version which combined ten-minute and 24-hour spaces appeared to be the most promising. However, a larger trial is required before drawing any firm conclusions about the effectiveness of SMART Spaces.</td>
</tr>
<tr>
<td>Was the approach feasible?</td>
<td>Yes</td>
<td>The programme was delivered successfully and was acceptable to both teachers and pupils.</td>
</tr>
<tr>
<td>Is the approach ready to be evaluated in a trial?</td>
<td>Yes</td>
<td>SMART Spaces is a well-defined and scalable programme that is ready for an efficacy randomised controlled trial (RCT).</td>
</tr>
</tbody>
</table>

**How secure is the finding?**

This evaluation was designed to provide feedback to the Hallam team throughout their development of the programme, and, at the end of the project, provide the EEF with a judgement of the programme’s evidence of promise, feasibility, and readiness for trial. It was conducted over one and a half years and divided into three phases:

- In the first phase, CESI worked with HTSA to carry out a literature review, which informed the design of a logic model for the programme and selection of three versions of the programme for later testing.
- The second phase used qualitative methods and worked with four schools to examine the feasibility of the three programme variations. The programme was adapted in response to feedback from this feasibility stage.
- The final phase aimed to provide some preliminary evidence about the effectiveness of the three different versions. The three programme variants were compared against a control group which received the PowerPoint slides, but no spacing protocol, and a control group which received neither slides nor spacing protocol.

**How much does it cost?**

The cost per pupil is £10. This cost is a one off cost to get the teacher trained and provide the school with the necessary materials to run the programme for three years. Changes in staff, and to the GCSE curriculum, may require refresher packs and training sessions for schools.

**EEF commentary**

We’re learning more all the time about how the brain works, but we can be slow to apply these insights to teaching. The Spaced Learning project is one of a series jointly funded by the EEF and the Wellcome Trust designed to improve pupils’ learning by applying findings from neuroscience.

‘Spaced learning’ involves repeating material at defined intervals, with unrelated activity in between, and has been shown in the lab to improve memory and retention. We piloted SMART Spaces, a spaced learning programme designed by Hallam Teaching School Alliance (HTSA), to investigate whether these benefits could be translated into the classroom. Teachers participating in the programme delivered three intensive lessons focused on science curriculum content, which were repeated over three consecutive days.

The findings suggest that SMART Spaces is promising: it incorporated spaced learning into lessons in a way that teachers found straightforward to deliver, and pupils appeared to respond well.
The next step is to find out whether the programme leads to improvements in pupils' learning by testing it in a rigorous trial. The EEF and HTSA are now discussing opportunities for this.