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SMART Spaces - spaced learning revision programme: an education endowment foundation efficacy trial

Submission date
26/02/2019

Recruitment status
No longer recruiting

Registration date
06/03/2019

Overall study status
Completed

Last Edited
18/08/2026

Condition category
Other

[_] Prospectively registered
[X] Protocol
[X] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
SMART Spaces revision programme is an intervention that uses spaced learning to revise chemistry for AQA GCSE double (or combined) award examinations. Evidence from neuroscience and cognitive psychology indicates that including spaces, time intervals, between learning sessions can improve factual recall. It is anticipated that improved factual recall will have a positive impact on the application and analysis as well as knowledge elements of the chemistry score in GCSE double award science. The aim of this study is to see whether the programme improves pupils' performance on the chemistry element of the AQA GCSE double award science.

Who can participate?
Secondary school pupils in Year 11 studying AQA double award GCSE science in the academic year 2018/19.

What does the study involve?
Participating schools are randomly allocated into two groups. The control group is business as usual. In the intervention group schools, science teachers receive training to deliver the SMART Spaces revision programme and implement the programme in science lessons with their Year 11 pupils. The programme consists of six lessons delivered over two weeks and is designed to space the revision of content both between and within lessons. The chemistry topics for AQA Paper 1 are covered in one SMART Spaces lesson. This lesson is repeated three times in the same week, with spaces which allow pupils a night-time sleep between lessons. After at least one further night-time sleep, but ideally the following week, the process is repeated for content associated with AQA Paper 2. Within lessons, chemistry topics are revised using the SMART spaces materials in three short sessions of approximately 12 minutes with 10-minute spaces between each topic. During the 10-minute spaces, pupils take part in a sensorimotor activity (such as juggling). Pupils' results in their Key Stage 2 English and Mathematics tests are collected at the start of the study and in their GCSE Chemistry examinations at the end of the study as measures of attainment.

What are the possible benefits and risks of participating?
Pupils in the intervention group will receive the SMART Spaces revision programme, with the potential to improve their performance in GCSE Chemistry. The control group is business as usual. As such, there should be no risks in participating in the trial.

Where is the study run from?
1. 125 secondary schools in England are taking part in the trial. 50 of these schools have been randomly allocated to the treatment group and will deliver the intervention to eligible pupils.
2. Queen's University Belfast, in partnership with the Hallam Teaching School Alliance, will train teachers to deliver the intervention.
3. University College London Institute of Education will independently evaluate the trial.

When is the study starting and how long is it expected to run for?
March 2018 to September 2019

Who is funding the study?
Education Endowment Foundation (UK)

Who is the main contact?
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Additional identifiers

Study information

Scientific Title
An efficacy trial of the SMART Spaces revision programme, investigating the effect of the intervention on students' attainment in the chemistry element of GCSE double award science: a two-arm randomised controlled trial

Acronym
SMART Spaces

Study objectives
The evaluation will address the following primary research question:
1. What is the size of the effect of the SMART Spaces intervention on pupils’ attainment in the chemistry element of GCSE ‘double award’ science when compared to a business-as-usual control, and is the effect practically distinguishable from a null effect?

In addition, the evaluation will address the following secondary research questions:
2. What is the size of the effect of the SMART Spaces intervention on pupils' attainment in GCSE 'double award' science when compared to a business-as-usual control, and is the effect practically distinguishable from a null effect?
3. What is the size of the effect of the SMART Spaces intervention on pupils' attainment in the assessment objectives constituting the chemistry element of GCSE 'double award' science (knowledge, application and working scientifically) when compared to a business-as-usual control, do the size of the effects differ for the difference objectives, and are the effects practically distinguishable from a null effect?
4. What is the size of the effect of the SMART Spaces intervention on the attainment of pupils eligible for free school meals compared to other pupils, and is the effect practically distinguishable from either a null effect or the effect on pupils' attainment in general?
5. Are the effects on attainment practically distinguishable for girls and boys?

In the associated implementation and process evaluation, the researchers will address the following research questions:
6. Was SMART Spaces implemented with fidelity in the trial, and to what extent can SMART Spaces be implemented with fidelity in a scaled-up version of the intervention?
7. Are there any barriers to implementation?
8. What role do heads of science play in facilitating implementation?
9. What are the most and least effective aspects of training teachers to deliver SMART Spaces with fidelity?
10. Do teachers and heads of science, perceive SMART Spaces to be a useful and engaging approach to revision?
11. To what extent does teacher engagement affect the quality of delivery and pupil responsiveness?
12. (a) Do teachers trial the spaced lessons before the intervention and do they practice or prepare in any other way? (b) Do they adopt spaced learning in other chemistry revision lessons?
13. (a) To what extent do teachers adapt the materials and approach? (b) In what ways do teachers and schools adapt their approach to science revision as a result of SMART Spaces?
14. (a) Are all pupils responsive to SMART Spaces and does it have reach: do all pupils perceive it to be an engaging and beneficial approach to revision? (b) What contributes to pupil engagement (or disengagement)?
15. Do some pupils adopt spacing practice within their own revision practices?
16. To what extent is SMART spaces distinguishable from 'business as usual' revision practice in schools?
17. To what extent does the logic model adequately describe the mechanism by which the SMART Spaces intervention effected change (if any)?

Ethics approval required

Old ethics approval format

Ethics approval(s)

1. Approved 30/04/2018 by UCL IOE Research Ethics Committee, Ethics and Engagement & Impact, UCL Institute of Education, Room 525, 20 Bedford Way, London, WC1H 0AL, Tel: +44 (0) 20 7 6126242, Email: ioe.researchethics@ucl.ac.uk, ref: REC1052 and data protection registration number: Z6364106/2018/03/25 social research
2. Approved 11/04/2018 by SSESW, QUB Research Ethics Committee, School of Social Sciences, Education and Social Work, 69/71 University Street, Belfast, BT7 1HL, Tel: +44 (0)28 9097 3041 /5906, Email: ssesw@qub.ac.uk

Primary study design
Interventional

Study design
Interventional cluster randomised trial

Study type(s)
Other

Health condition(s) or problem(s) studied
15 – 16 year old pupils in Year 11 studying AQA double award GCSE science

Interventions
Participants are clustered into 125 schools divided between two arms with 50 in the intervention arm vs. 75 in business-as-usual control.

1. SMART Spaces Chemistry Revision programme. The intervention consists of two elements: training for teachers to deliver the SMART Spaces revision programme and implementation of the programme in science lessons.
2. Control: schools will continue with “business as usual”, revising chemistry using their normal approaches.

All teachers who will deliver SMART Spaces programme are trained in a half-day training session, which includes a demonstration of part of a SMART Spaces lesson and a chance to try out delivery in a trial run and get initial feedback. In addition, all schools will receive a manual and video at the training session.

The SMART Spaces programme consists of six lessons delivered over two weeks. The chemistry topics for AQA Paper 1 are covered in one SMART Spaces lesson. This lesson is repeated on three separate days, over a minimum of three days and a maximum of a week, providing spaces which allow pupils a period of sleep between content repetitions. After at least one further sleep, but ideally the following week, the process is repeated for content associated with AQA Paper 2. In a SMART Spaces lesson, chemistry topics are revised using the SMART spaces materials in three short sessions of approximately 12 minutes with 10-minute spaces between each topic. During the 10-minute spaces, pupils take part in a sensorimotor activity from a menu of suitable activities, including juggling.

Intervention Type
Behavioural

Primary outcome(s)
Year 11 pupils’ attainment in chemistry measured by their raw scores in the chemistry element of GCSE ‘double award’ science in May/June 2019

Key secondary outcome(s)
1. Science attainment in AQA GCSE Double Award Science, based on Uniform Marking Scale scores rather than numerical grades, in May 2019
2. The knowledge, application and analysis assessment objectives sub-scales for the Chemistry element of AQA GCSE Double Award Science, a continuous numerical variable based on item-by-item mark data, in May 2019

Completion date
30/09/2019

Eligibility

Key inclusion criteria
Pupils must be in Year 11 in the academic year 2018/19 and enrolled in AQA GCSE double award science

Participant type(s)
Other

Healthy volunteers allowed
No

Age group
Child

Sex
All

Total final enrolment
0

Key exclusion criteria
Pupils not enrolled for AQA GCSE double science or attending schools which are participating in another EEF GCSE science randomised trial

Date of first enrolment
01/04/2018

Date of final enrolment
01/12/2018

Locations

Countries of recruitment
United Kingdom

England

Northern Ireland

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UCL Institute of Education
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20 Bedford Way
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England
WC1H 0AL

Study participating centre
Queen's University Belfast
004 69-71 University St
Belfast
Northern Ireland
BT7 1LN

Study participating centre
Hallam Teaching School Alliance
Notre Dame High School
Fulwood Road
Sheffield
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S10 3BT

Sponsor information

Organisation
Education Endowment Foundation

ROR
https://ror.org/03bhd6288

Funder(s)

Funder type
Charity

Funder Name
Education Endowment Foundation

Alternative Name(s)
EducEndowFoundn, The Education Endowment Foundation (EEF), Education Endowment Foundation | London, EEF

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
At the end of the trial, participant-level data will be deposited in the Education Endowment Foundation's (EEF) data archive, one month after the EEF evaluation report is published (expected publication date July 2020). This archive is managed by the Fischer Family Trust (FFT), the EEF's data processor, and will be stored on the Secure Research Service (SRS) operated by the UK's Office of National Statistics (ONS). The dataset will be stored in a pseudonymised form and will include pupil and teacher demographic, test and survey data. The dataset will only be available through the SRS to approved researchers via ONS operated safe rooms or other ONS approved settings. ONS-approved researchers will be able to apply to access the dataset via the FFT. Participants, and pupils' parents, were provided with information about data storage and processing at the start of the trial and were given an opportunity to withdraw their data. Details of the ONS SRS are available here: https://www.ons.gov.uk/aboutus/whatwedo/paidservices/virtualmicrodatalaboratoryvml

IPD sharing plan summary
Stored in repository

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Funder report results		01/07/2023	18/08/2026	No	No
Plain English results			18/08/2026	No	Yes
Protocol file	version 1.0		18/08/2026	No	No
Statistical Analysis Plan	version 1.0	12/04/2019	18/08/2026	No	No
Study website	Study website	11/11/2025	11/11/2025	No	Yes