Learning behaviours and successful outcomes in STEM students

Throughout 2020, this eSTEeM-funded project has investigated the relationship between learning design and learning behaviours, in order to establish the correlation between these and student outcomes.

Learning behaviours

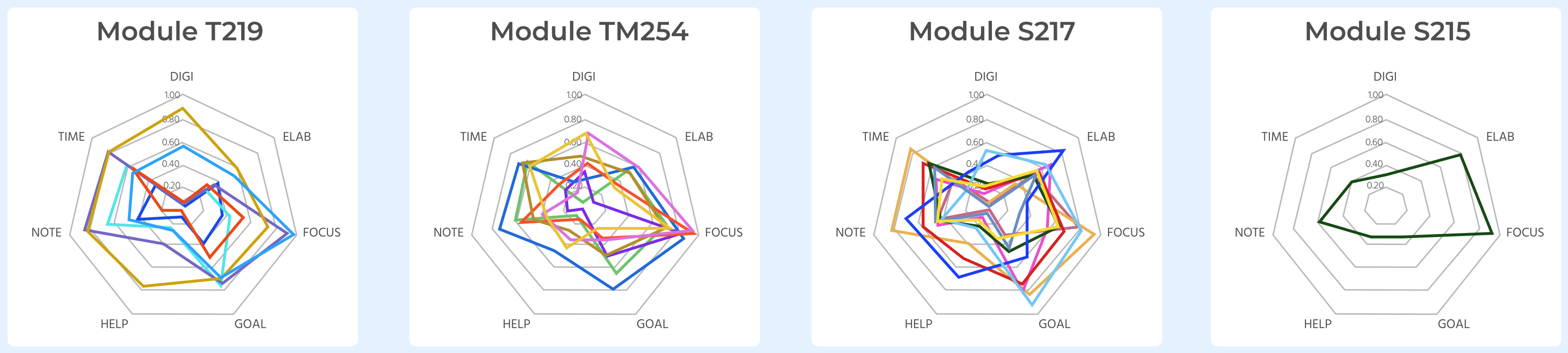
Students from four STEM modules completed the 'Learning Behaviour' survey. Students from the same modules express different learning behaviours, but similar patterns emerge.

Learning Behaviours

- DIGITAL-PREFERRED
- ELABORATION
- FOCUS
- GOAL-SETTING
- HELP
- NOTE-MAKING
- TIME

! Students engaging in the 7 Learning Behaviours are likelier to progress.

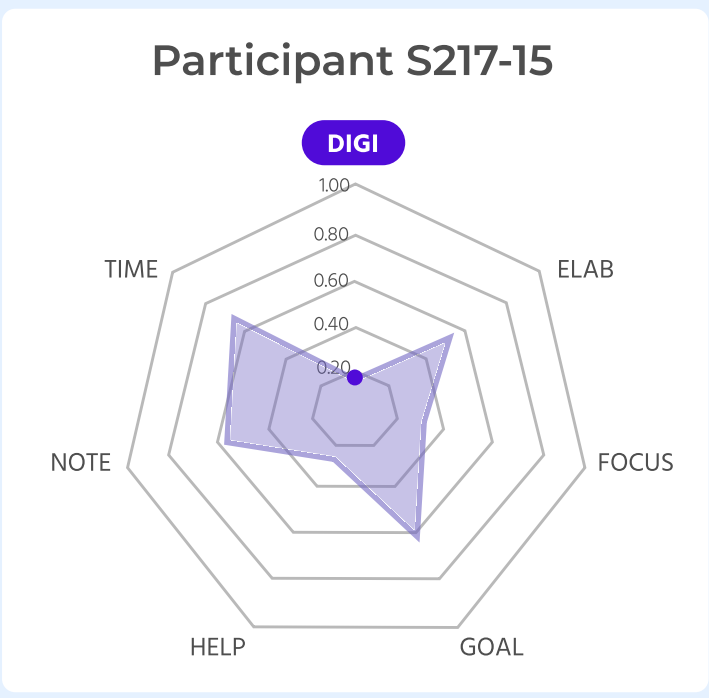
Students from four STEM modules participated in the 2020 survey (N=37)



Each line represents an individual student's response. These R-Profiles demonstrate the intensity with which the student expresses their learning behaviours.

We conducted 4 in-depth semi-structured interviews to gain a deeper understanding of each student's experiences, and gather additional insight into their learning behaviours.

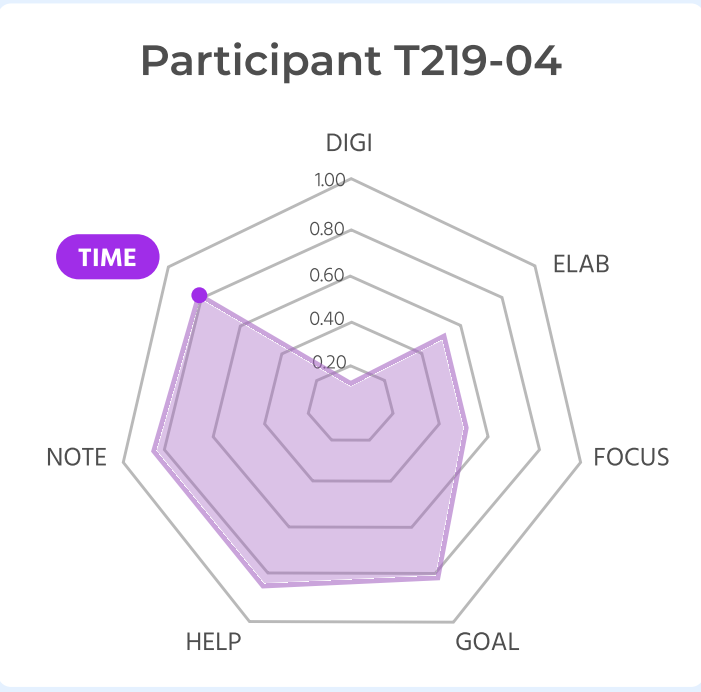
Participant S217-15



DIGI

> The material that's online, right, you have virtual experiments that you can carry out, and observations you can make, or there's a lot of this extra trivia and snippets of, you know, extra information, that makes it extremely interesting. ... And I think that helps fill some of these little gaps that pop up every now and then.

Participant T219-04



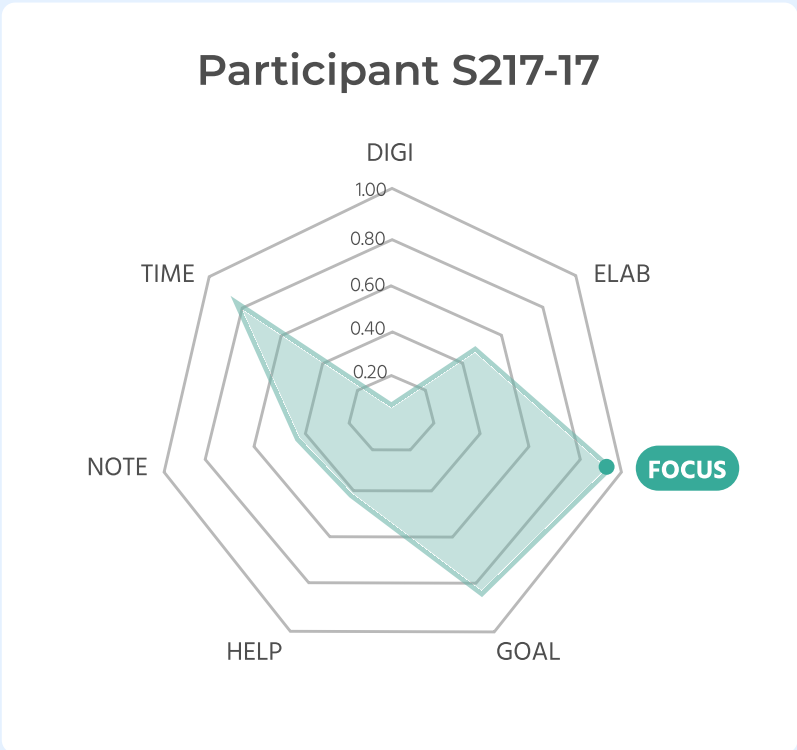
TIME

> If I'm perhaps, if I feel that I'm pushed for time [I would] be naughty and write a couple of words and then it'll let me reveal the answer.

FOCUS

> It depends on my level of concentration at the time and the focus I can muster. If I have a lot of it I would read through say a whole page, the equivalent of a tab, think about it and then write notes on it, then reread it and then carry on. If I have say, I don't know, a mediocre amount of concentration, then I will make notes as I read it.

Participant S217-17



GOAL-SETTING

> For example, [...] what can I do in half an hour? If I have like a big article, right, I wouldn't even take it, but if I see that in half an hour I have like little section for one page I can take that.

Participant T219-07

We found that

1. Relationships exist between Learning Behaviours, certain behaviours can trigger each other.
2. Learning Behaviours are present in the learning design of modules, and could trigger particular behaviours in students.

Relationships between Learning Behaviours

GOAL TIME

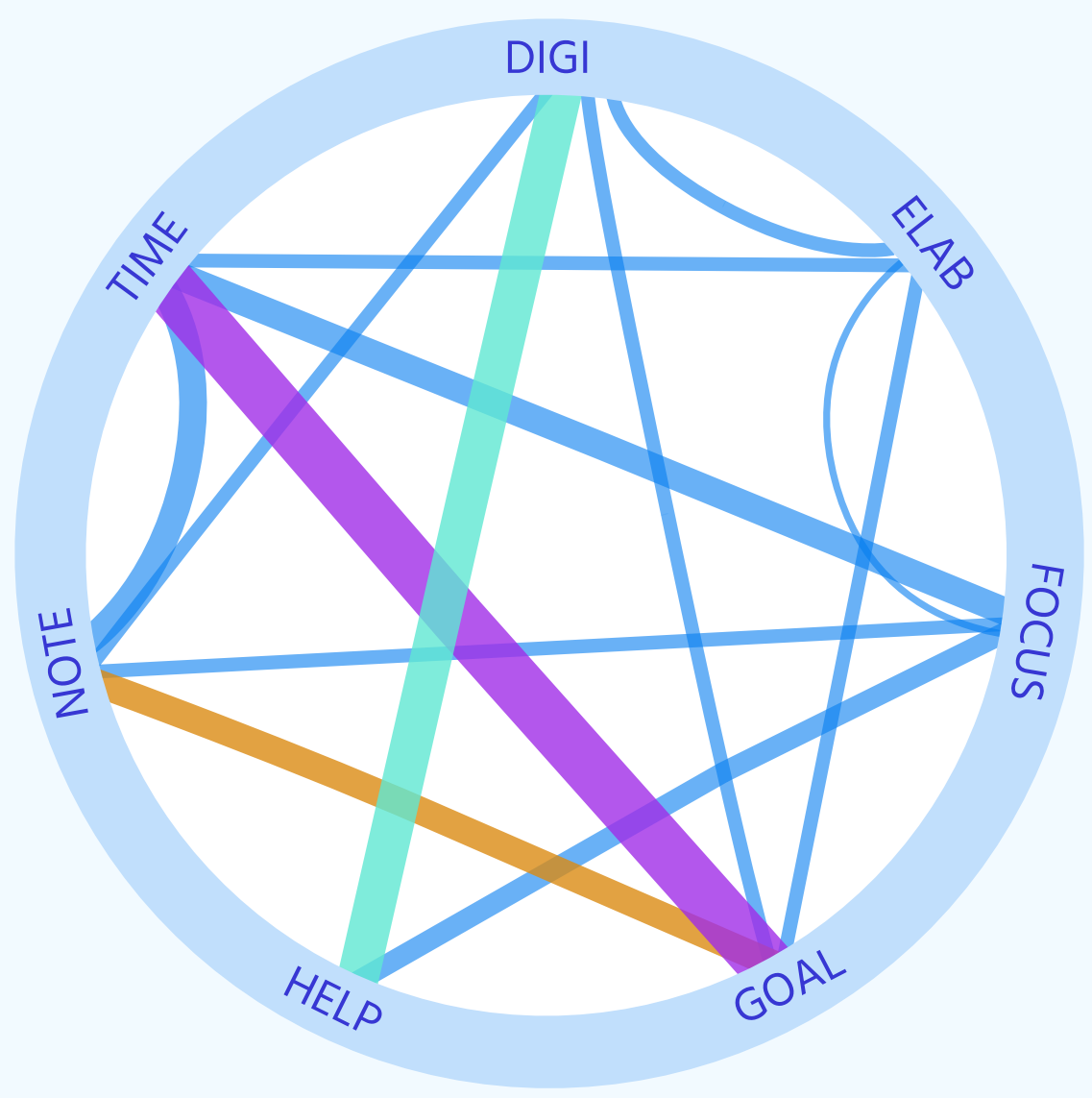
Goal-setting often involved aiming to keep up with studies, and frequently had to be set based on the time available. Participants who discussed planning their study to match the needs of an assessment also referred to having little time to review the material.

DIGI HELP

Any interaction between students was conducted online, and participants talked about forums in the context of seeking help.

NOTE GOAL

Assessment-related goals often involved making notes as to what was important for the assessment, or re-reading or re-writing notes.



Thickness of lines inside the circle represents strength of connection between Learning Behaviours.

Are the learning behaviours of students being triggered by the design of their modules?

We conducted an analysis to identify relationships between Learning Behaviours and the Learning Design activity types, as set out by the OU Learning Design Framework.

By identifying behavours already present within module content, recommendations can be made for designing interventions for those which are not.

Learning design

OU modules are designed around 6 activity types. Incorporating the data from the coded interviews, we conducted a thematic analysis of the module content using NVivo and the OU's Learning Design Online tools. We explored where learning activities coincided with learning behaviours, to examine both the presence of behaviours within module activities, and the relationship between the two.

Learning activities

Assesment	All forms of assessment, whether continuous (OCAS), end of module (OES), or formative
Assimilative	Reading information, listening to it or seeing it and reviewing it
Communicative	Discussing learning materials with other students and/or a tutor
Finding and handling information	Searching for new information and processing it, individually or in groups
Practice	Students apply their learning in a real-world or simulated setting
Productive	Applying knowledge and skills either individually or as a group to create a piece of work

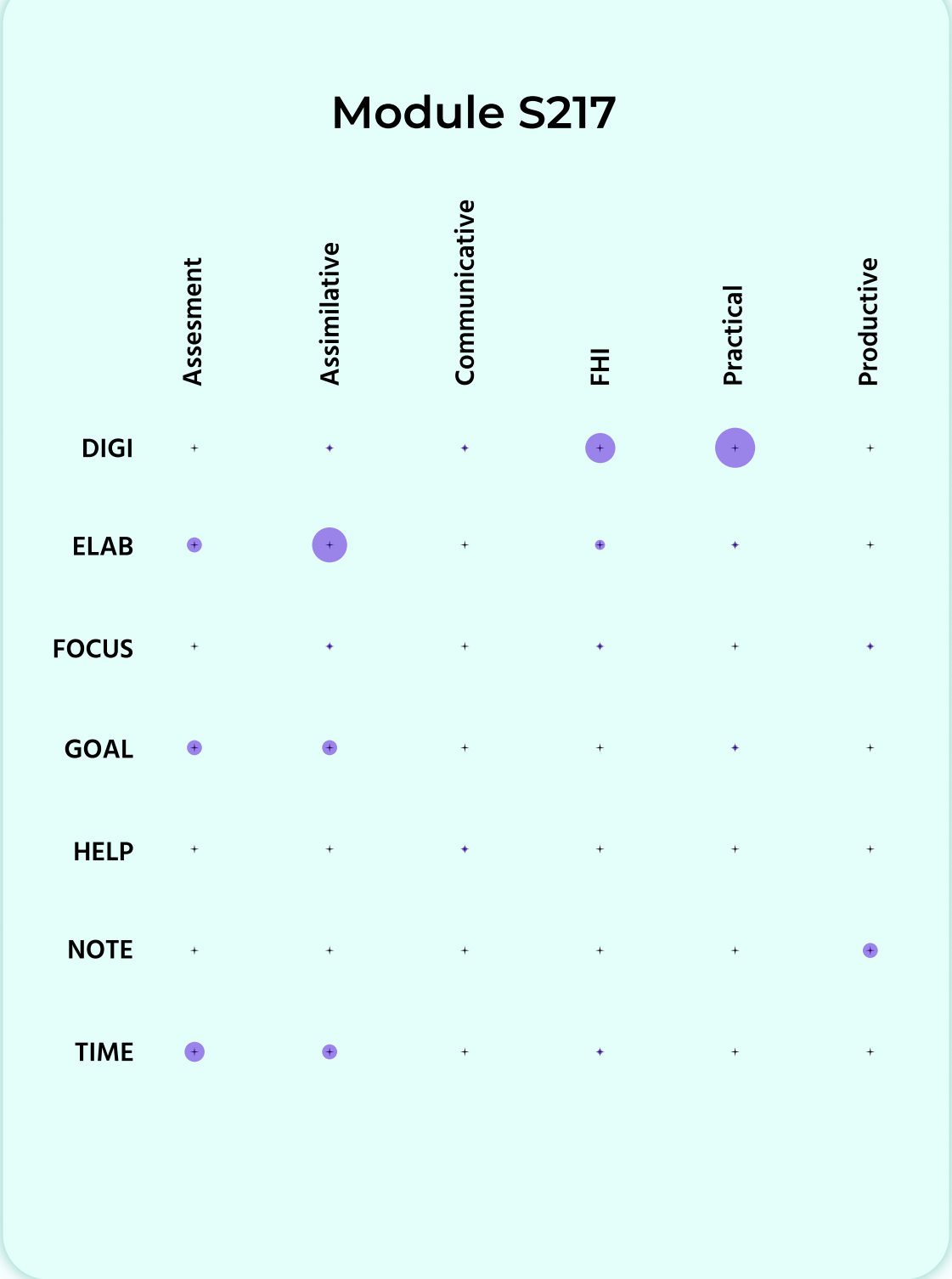
Learning behaviours

Digital-preferred (DIGI)	Using digital technology or media
Elaboration (ELAB)	Seeking information and relating new ideas to known ones
Focus	Avoiding clutter and distruction including online
Goal-setting (GOAL)	Setting goals and planning ahead
Help-seeking (HELP)	Connecting with others for support with their studying
Note-taking (NOTE)	Making physical and digital notes
Time	Prioritising time to spend studing

Module TM254

Module T219

Module S217



Conclusions

①
Students demonstrate a variety of learning behaviours, but patterns of behaviour exist.

②
Students who demonstrate learning behaviours are likelier to progress.

③
Relationships exists between Learning Behaviours (i.e. certain behaviours can trigger each other).

④
Learning Behaviours are present in the learning design of modules (i.e. can trigger particular behaviours in students while studying).

⑤
By designing interventions and deploying these through module content, individual students and cohorts of students could be encouraged to undertake behaviours that would lead to more successful outcomes.