> Research demonstrates that e-learning can be used to boost academic performance, but it must be well geared to student abilities
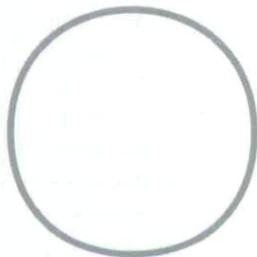>
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# A question of style and substance

Over the past decade, we have seen a dramatic increase in the use of e-learning based teaching. As this use develops it is increasingly important to examine the factors that have an influence on the effectiveness of this form of pedagogy so that we can find ways of improving student performance.

There is a considerable body of evidence that suggests the use of different teaching delivery styles can have a large impact on students' academic results. But the larger issue here, in relation to e-learning, is why? Some studies suggest that online teaching methods have a positive impact on performance, for example, through the promotion of greater student centred learning. However, other studies suggest that a high level of online teaching can have a negative impact on performance, as it can result in students becoming alienated from the subject matter.

Research at Coventry University has looked at the impact the level of engagement in e-learning has on student academic performance in higher education. This work has provided some insights into developing a better understanding of the relationship between student performance and e-education teaching styles.

The study examined student performance on a level one Data Skills and Statistics module taught using a mixture of traditional lectures and e-learning methods. It involved a group of 113 accounting and finance students who were required to use a variety of online and computer-based resources to find, examine and analyse statistical data on real world economic and social issues. There was also a series of teaching materials provided online, including practical exercises and access to lecture notes.

## Teaching style

Previous studies made in a non e-learning context have shown that teaching style has a considerable impact on performance. For example, experimental teaching methods have been found to produce better academic results than those that can be characterised as more traditional methods. However, these studies made no attempt to examine whether the better results were due to the teaching methods being more efficient, in terms of better reflecting student learning styles, or whether they were better because the experimental approach encouraged greater student engagement and effort.

My research indicates that in relation to e-learning, both student engagement level differences, essentially time spent online, and student learning style differences have an important impact on overall performance.

Using a regression based statistical analysis it was found that, after controlling for other factors, differences in student engagement accounted for around 6% of the variation in student marks. For the average student, an extra hour of e-learning engagement increased the module mark by 1.035%. This suggests that if teachers want to improve student performance they may be advised to look for ways that encourage students to engage more actively in the e-learning process.

The other significant finding of the research is that students from different backgrounds appear to

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benefit from e-learning by different amounts. It was found, for example, that although female students outperformed their male peers by a significant margin, after controlling for other factors, there was a negative effect between gender and the time spent engaged in the e-learning process. The data indicated that the benefit that female students derived from a given level of e-learning effort was in the region of 1% less than that gained by equivalent male students.

Although this amount is small, it is statistically significant and provides evidence to support claims found in academic literature that different student types have different learning styles. For example, many students do not learn in the systematic way that is implied by the structure of many e-learning packages and many use materials in different sequences and are selective in their e-learning interactions and readings.

## The gender gap

Tentatively, it can be inferred from these results that there may be systematic differences in the ways that male and female students learn in an e-learning context. Previously, it has been suggested that male and female students interact with online teaching resources differently and that there is a need for online instructors to be aware of gender differences when developing teaching material.

The e-learning package used in this study was developed by a male academic. It is possible that this is at the root of the negative interaction found as it may be that the structure of the material reflects a male learning style.

The study also uncovered other evidence of possible learning style related differences in performance. For example, there was evidence of an interaction between a student's country of origin and e-learning engagement. Overseas students appeared to benefit less from e-learning material than their home student counterparts. This is possibly because the teaching materials were developed by a western academic and may well have been more suited to the learning styles of western students.

The main recommendation for e-learning education practitioners reached from the study is that, in order to improve teaching effectiveness and academic achievement, higher education should consider aiming to develop e-learning teaching strategies that both encourage greater engagement and also take into consideration the different learning styles found within the student body. The key advantage of this teaching medium is often seen to be that it allows students to interact more fully with the teaching material and their peers. If teachers are not careful in the way they use this form of pedagogy this advantage could be easily lost.

## Group work

It may be possible to adjust teaching styles to cater for the needs of specific groups, for example, where there are large numbers of international students, or where there is a major gender imbalance. It may also be appropriate to give additional instruction on how to use computer-based material to students with little previous experience of the medium. This may prove to be important as evidence suggests that computer experience is often a good predictor of attitudes to, and use of, this type of material.

A further approach may be to develop student learning groups with mixed levels of computer experience in order to encourage peer-to-peer learning. Research has shown that group work increases learners' abilities in managing and organising their thinking and activities. Group work mimics a classroom setting with a small number of students working together to address a specific task and is considered to be just as effective through an online format. Using this method, students have the ability to research in their own time, make use of private online meeting spaces and use instant messaging programmes that can make online communication between group members frequent and almost immediate. In this way, the group members have the freedom to interact in complex ways, expressing opinions and working collaboratively. Beyond simple activities, such as group discussion, the technology can allow students to role play and share thinking on scenarios and challenges.

As teachers, we need to organise our e-teaching in ways that encourage all types of students to fully engage in productive peer-to-peer learning. My experience has been that both home and international students with a limited computing background tend to find e-learning based modules difficult. It may well be that, in some cases, we need to teach students how to learn using the medium before we use it as a tool to teach the subject itself.  e

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