Integrating advanced computational tools into geotechnical engineering education: an example of transformative learning through digital technology

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ABSTRACT: This work aims to demonstrate how cutting-edge technology in Ansys, a FEM/CFD software with real-time simulations and visualizations, can be integrated into undergraduate geotechnical engineering modules. The software was first introduced in the 2nd year Soil Mechanics module as a virtual laboratory for teaching seepage theory in soil mechanics. Through this virtual laboratory, students were able to better visualise how water flows through soils, providing a 'virtual' hands-on experience that complements effectively learning via traditional lectures or textbook reading. Key 'educational' features of Ansys, including the intuitive user interface in Ansys Discovery and the ability to mask the FEM mesh, played a crucial role in the success of these virtual laboratories. These features allowed undergraduate students, even without prior FEM experience, to effectively grasp the main learning outcomes of the module. In this paper, the educational effectiveness of this advanced technology is evaluated through the students' academic perception, engagement level, and performance. A comparison is made between the traditional delivery of soil mechanics content and the technology-assisted approach. Using the educational insights gained, a plan is outlined for integrating Ansys technology into broader soil mechanics and geotechnical engineering topics, such as advanced foundation design and slope stability analysis.

Keywords: Digitally-enhanced learning, Numerical modelling, Soil Mechanics

1 Introduction

Several studies have focused on integrating digitally-assisted into the existing geotechnical engineering curriculum (Jaksa, 2020; Rehman, 2023). Key advancements include the use of virtual laboratory testing (Airey et al., 2012; Ledesma Villalba et al., 2022; Allawi, 2023), online learning platforms (Rehman, 2023), and most notably computer-aided instruction (Toll & Barr, 1998; Oliver & Oliphant, 1999; Isik & Cabalar, 2018; Allawi, 2011; Yin et al., 2022). One of the major benefits of this trend is the ability to enhance students' visualization and problem-solving skills, enabling them to tackle challenges that extend beyond traditional theoretical frameworks presented in textbooks. Recent technological advancements in geotechnical engineering, such as numerical simulations and visualizations of complex geo-structures, have progressed faster than the development of existing educational resources. This is particularly significant for undergraduate students, who primarily focus on theoretical knowledge in geotechnical engineering modules. While fundamental analytical and conceptual models remain essential for teaching the core concepts of geotechnical engineering, developing a curriculum that integrates computer-aided approaches early in the learning process is crucial for the success of future geotechnical engineers.

Integrating computer-based methods into geotechnical engineering modules offers affordable educational tools, better prepares students for real-world industry challenges, and enhances the effectiveness of online learning by providing flexible and interactive experiences. Early educational platforms for teaching geotechnical engineering relied on simple, yet effective, homemade software to cover fundamental topics such as soil classification (Isik & Cabalar, 2018), seepage in soil (Allawi, 2011), slope stability (Yin et al., 2022), foundation design (Toll & Barr, 1998) and effective stress concept (Oliver & Oliphant, 1999). While these tools are well-suited for their intended purpose and offer immediate pedagogical benefits with minimal prior knowledge required, their use is limited in terms of scope of engineering applications. They were not easily adaptable to real-world scenarios or complex geotechnical labs and often become outdated, falling behind the latest advancements in the field (Houston, 2019). The integration of modern commercial geotechnical software, into teaching and learning can help address several educational challenges, fostering greater student engagement and enhancing graduates' employability (Pinho-Lopes, 2012; Szavits-Nossan, 2012). However, despite these advantages, the complexity of such software, particularly its basic user interface for early-year students, the limited availability of qualified instructors, and the lack of widespread free access to these tools remain a significant barrier to their broader adoption in geotechnical engineering education.

The purpose of this work is to integrate a comprehensive engineering software package, Ansys, into the teaching of the Soil Mechanics module at the University of Strathclyde to enhance students' understanding through computer-aided learning. New features of Ansys technology, such as Ansys Discovery, are integrated into the existing curriculum of the Soil Mechanics module to improve quantitative and qualitative learning outcomes and to expose students to industry-standard tools. The future goal is to integrate Ansys tools in other civil engineering modules to ensure that students are thoroughly equipped with technology skills to tackle real-world challenges in the civil engineering field.

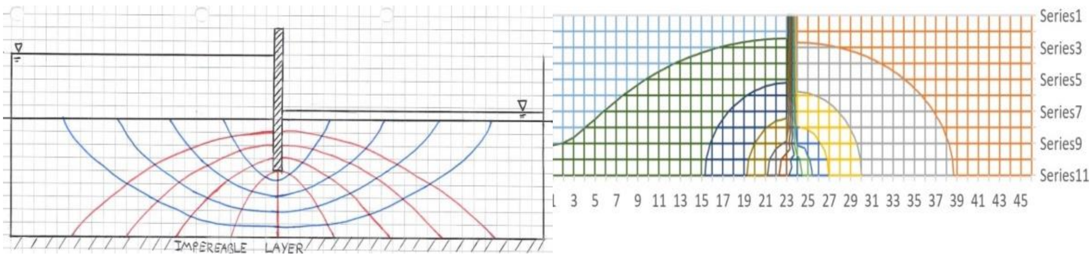
2 Methodology

This study evaluates the outcomes of integrating a technology-enhanced framework into the existing Civil and Environmental Engineering (CEE) degree programs at the University of Strathclyde. The framework was introduced in the Soil Mechanics module, a 20-credit, second-year module offered within both the Bachelor of Engineering (BEng) and Master of Engineering (MEng) programs. The BEng program is completed over four years with 480 credits requirement, while the MEng program spans five years with 600 credits requirement. Students enrolled in the BEng pathway are eligible to transfer to the MEng program if they achieve a credit-weighted average above 60%. Typically, approximately 100 students enrol in the BEng program each year. In the second year, students must successfully complete six compulsory modules — each worth 20 credits — to progress to the third year. Instruction is primarily delivered through face-to-face teaching, with online classes permitted under certain circumstances. The total workload for the Soil Mechanics module is 200 hours, which includes 32 hours of lectures, 26 hours of tutorials, 10 hours of laboratory sessions, 14 hours of coursework, and 118 hours of independent study, over 12 weeks. In Semester 1 of the Soil Mechanics module, two key learning outcomes are established. First, students are expected to develop an understanding of groundwater flow and the ability to predict pore-water pressures under the steady-state conditions. Second, they should grasp the concept of effective stress in saturated soils and be able to analyse the soil stress state under both hydraulic and mechanical loading.

Although the module spans two semesters, the technology-enhanced framework was implemented only during semester one, specifically in one of the laboratory sessions. In the previous academic year (2023/24), conventional teaching methods were used for this laboratory session, providing a point of comparison for evaluating the effectiveness of the new approach. For this initial trial, the assessment structure remained unchanged from the prior year: 20% of the final grade was based on online quizzes, 20% on laboratory assessments, and 60% on the final exam. The computer laboratory component contributed 10% to the overall grade within the laboratory assessment category. Students' performance was assessed through reports submitted via the University of Strathclyde's online learning platform. The following sections detail the original and revised laboratory sessions and provide a comparative analysis. The effectiveness of the newly implemented framework will then be evaluated.

3 Existing laboratory for Soil Mechanics module

The Soil Mechanics module is a core component of the early-stage curriculum in civil and environmental engineering undergraduate programs. Its primary goal is to introduce students to the physical, hydraulic, and mechanical behaviour of soils, focusing on their application in construction and landscaping projects. At the University of Strathclyde, traditional teaching methods, including theoretical lectures and hands-on laboratory and computer sessions, are employed to deliver this module over two semesters. The prerequisite for this module is the 'Fundamentals of Civil Engineering' module, where students are introduced to basic concepts related to soils and rock material characterisation during their first academic year. In the first semester of the second year, students participated in computer laboratory sessions where they used a simple finite difference spreadsheet, known as Seepage_CSM8, to calculate seepage around a sheet pile wall. This laboratory session aligns with the first learning objective, where students learn to predict pore-water pressures under steady-state conditions. They first learn the theoretical foundations of the finite difference method (FDM) applied to the solution of the Laplace equation in the class and then view a training video on Seepage_CSM8 prior to the laboratory sessions, following a flipped classroom approach (see Moghaddasi et al., 2024). The theoretical framework of the FDM was taught during a dedicated two-hour lecture, followed by a tutorial session demonstrating hand calculations using the FDM approach. This laboratory also includes manual calculations of seepage problems using the flow net approach, which is then compared with the numerical solutions obtained from Seepage_CSM8. The students compare their FDM solution with the results obtained through hand calculations and reflect on the reasons for any discrepancies. An example of a submitted assignment is shown in Figure 1, where students use both hand-calculations and spreadsheet software (traditional approach). Since the software is based on a spreadsheet (MS Excel), students are already familiar with the user interface and require minimal assistance for training of the spreadsheet. However, feedback from the instructor indicated that the spreadsheet software was not able to effectively visualize flow lines or simulate problems with large dimensions or finer mesh. Student feedback also highlighted difficulties in detecting errors during mesh refinement, particularly when incorrect equations were entered into the Excel cells. Additionally, students reported frequent spreadsheet crashes while solving flow equations iteratively. Another notable issue was that Seepage_CSM8 is designed solely for solving uncoupled flow problems (no deformation analysis) and can only handle 2D cases.



(a) (b)

Figure 1. Examples of submitted students' work using (a) flow net approach and (b) Seepage_CSM8 (traditional approach)

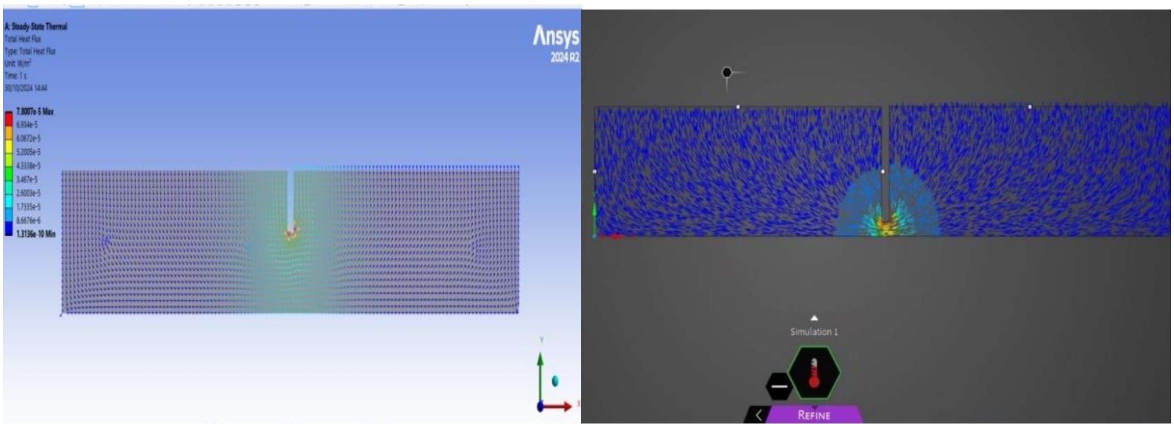
4 Revised laboratory for 'Soil Mechanics' module

Within a joint collaboration between the University of Strathclyde and the Ansys company, a computer-aided learning framework was established to integrate Ansys technologies in the existing Civil Engineering undergraduate curriculum offered by the department of Civil and Environmental Engineering. This is part of an Ansys-funded curriculum program designed to support accredited educational institutions in developing computer-aided programs using Ansys technology. Ansys is a powerful software suite for finite element analysis (FEA) and computational fluid dynamics (CFD), essential for simulating complex civil engineering problems. Its wide range of simulations across various physical phenomena and materials, combined with advanced post-processing and visualization tools, make it an invaluable resource for teaching. Due to the significant limitations of Seepage_CSM8, Ansys technology was introduced for the first time in the computer laboratory of the Soil Mechanics module in the 2024/25 academic year. To support students, an Ansys educational page was created on MyPlace (the Strathclyde University portal for teaching and learning), and a series of training videos were recorded at the Strathclyde Professional Studies, supplemented by additional resources from the Ansys educational website. Since second-year students are not yet familiar with the basics of FEM for solving flow equations, a brief lecture was dedicated to explaining how the 2D Laplace equation can be solved using FEM. As in the previous teaching round, a flipped classroom approach was utilized, incorporating several pre-recorded ANSYS videos to support students prior to the computer laboratory sessions. During the laboratory sessions, students were encouraged to replicate the procedures demonstrated in the videos for a typical seepage problem. After the sessions, students applied their learning to solve an actual example provided in the laboratory handout. Similar to the previous teaching round, hand-calculation using flow net approach was part of the laboratory reports submitted by students. The students compare their FEM results with those derived from hand calculations and analyze the reasons for any discrepancies. Additionally, there is a reflection section where students document the assumptions and limitations of both the hand calculations and numerical results. It is important to note that students worked in groups of approximately four members during all laboratory sessions. In the live laboratory classes, students were instructed to replicate the model demonstrated in the training videos. After the sessions, students held group meetings to focus specifically on the laboratory problem and collaborate on their work.

While Ansys APDL does offer solutions for flow in porous media, it was decided not to use this package for teaching due to its relatively complex user interface and the software's complexity not suited for second-year CEE students without prior FEM knowledge. In contrast, Ansys Workbench and the newly developed Ansys Discovery were considered as most suitable options. Due to minimal prior FEM knowledge, undergraduate students may struggle with advanced topics like mesh dependency, which could negatively affect their perception of basic FEM usage. Specifically, Ansys Discovery is particularly well-suited for teaching first- and second-year students due to its user-friendly interface, which simplifies the learning process. Its ability to provide instant solutions to problems, along with the integration of FEM without requiring students to interact with the underlying mesh, makes it an effective tool for early year engineering education. This approach not only enhances students' creativity but also helps them develop stronger engineering judgment and a more expansive vision of problem-solving in their field (Wirth et al., 2017). The advantage of ANSYS Workbench is that it integrates multiple physics, such as structural analysis, fluid dynamics, and soil analysis, allowing for their interaction within real-world problems to provide comprehensive solutions. A crucial aspect of teaching FEM to students with no prior knowledge is to start with simple examples that have known analytical solutions. One such example is demonstrated in a training video, where students observe a 1D bar under axial loading solved through hand calculations, ANSYS numerical methods, and an analytical closed-form solution. Although this example is not related to seepage problems, it effectively helps students understand the complex concept of FEM. A comparison between the existing laboratory sessions taught during the 2023/24 academic year and the revised laboratory session is provided in Table 1. One challenge in using Ansys Discovery or Ansys Workbench was that simulation of flow in porous media was not directly available in these packages. To address this, an analogy was drawn between the governing equations for total head variation in soils and temperature variations. Due to the mathematical similarities (both processes are governed by the same ‘diffusion’ equation), thermal analysis techniques were used to simulate the flow solution. While part of the previous laboratory, which involved hand calculations using the flow net approach, was retained in the revised sessions, Seepage_CSM8 was replaced by Ansys Workbench and Ansys Discovery. An example of the simulated flow results submitted by students using Ansys Workbench and Ansys Discovery is shown in Figure 2. In terms of the effort required from instructors to implement the revised laboratory session, it is important to note that learning new software can be demanding not only for students but also for instructors. To support instructors, a comprehensive and detailed guide has been developed and will be made publicly available through ANSYS educational resources, enabling its use by educators across various CEE programs.

Table 1. The summary of key differences and similarities across two teaching rounds

	Computer laboratory in 2023/24	Computer laboratory in 2024/25
Similarities	❖ The hand-calculation using flow net approach ❖ 10% assessment weight ❖ Numerical solutions included ❖ Flipped classroom approach used	❖ The hand-calculation using flow net approach ❖ 10% assessment weight ❖ Numerical solutions included ❖ Flipped classroom approach used
Differences	• FDM is easily teachable to students with minimal prior knowledge • 2D FDM solution using spreadsheet • Unable to solve 3D problems • Poor in visualisation and troubleshooting • Learning outcomes limited to the scope of laboratory sessions	• FEM is challenging for students to grasp without strong foundational knowledge • 2D FEM solution using Ansys workbench • 3D FEM solution using Ansys Discovery • Instant solutions with strong visualisations capacity • The skills learnt can be used in other CEE area



(a) (b)

Figure 2. The example of submitted students' work (revised approach) using a) Ansys Workbench b) Ansys Discovery

5 Results and discussion

The effectiveness of the new approach to enhance the teaching and learning experience was evaluated by comparing key performance indicators across two academic years. These indicators include student engagement, academic achievements, and overall perceptions of the learning process. It is important to note that 101 students participated in the academic year 2023/24 module with the previous computer laboratory design, whereas 118 students were registered to the 2024/25 module, which featured the revised virtual laboratory sessions. The number of students submitting a work for this assessment was 89 in the academic year 2023/24 compared to 111 in the academic year 2024/25. In order to determine student satisfaction, two anonymous modules evaluation survey have been employed. The first survey was conducted by the university to obtain the overall satisfactions of students about 'Soil Mechanics' class and its results are depicted in Figure 3. The survey was conducted at the end of Semester 1, after students received feedback on their computer laboratory sessions, but before their final exam marks were issued. Around 15% participation rate was recorded in both the 2023/24 and 2024/25 surveys. During the 2024/25 academic year, a small number of students expressed dissatisfaction or indifference towards the class organization and available learning resources. This could be due to the delayed release of laboratory group lists and the late posting of lecture notes for the FEM section. Additionally, some students may require further support with the theoretical aspects of FEM, as this method was only introduced in a single lecture session. Overall, the number of highly satisfied students in the 2024/25 academic year significantly increased compared to the academic year 2023/24, particularly in key areas such as the availability of resources. This improvement is related the computer laboratory added in the 2024/25 academic year, the only new resource introduced in the overall class.

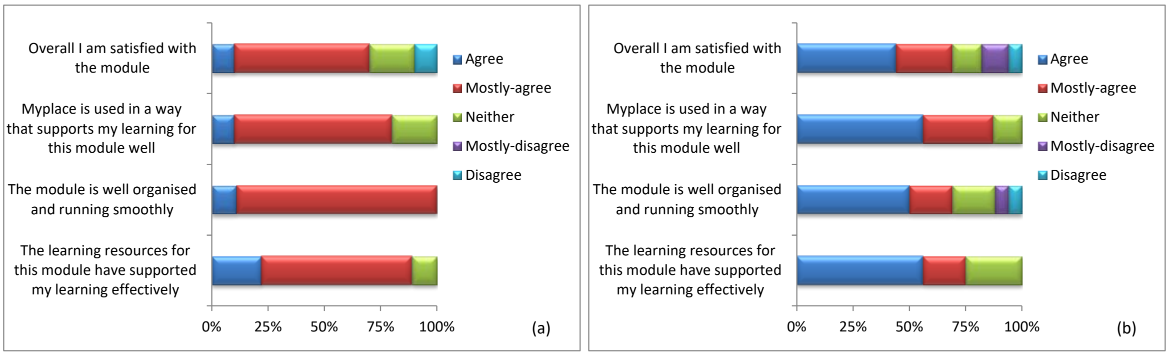


Figure 3. The results of surveys performed by the university in a) academic year 23/24 b) academic year 24/25

To gather student feedback on the revised laboratory sessions, a dedicated survey was also created and distributed to those participating in the upgraded computer laboratory. The survey was made available after the computer laboratory session and encouraged by the instructor during the following lecture. Additionally, dedicated time was allocated within the lecture for students to complete the survey. This took place before the students received their laboratory session and final marks. The survey benefited from a high response rate of 42%, with 78% of participants identifying as male, 18% as female, 2% as non-binary, and 2% as unidentified in terms of gender. The main results of survey have been plotted in Figure 4 and a summary of the survey has been given in Table 2. Also, there were a number of open questions. The Likert scale with the range one to five was used in the survey to find the agreement percentage. Around 58% of students indicated they had received training in other engineering software before using Ansys, with most mentioning (as an explanation question) AutoCAD as the software they had previously worked with, primarily focusing on drawing features. As expected, the majority of students had no prior experience with simulation software. The summary of survey results is provided in Table 2. In terms of available resources, most students found that the combined materials provided by the Strathclyde and Ansys team before the class were very helpful in learning the basics of Ansys tools (see Moghaddasi 2024). However, some students suggested that more experienced laboratory demonstrators should be present during the live classes to assist with troubleshooting. Potential solutions to address these concerns consist in inviting Ansys staff to the live laboratory sessions, organising professional training for the demonstrators, and setting up a troubleshooting forum on the MyPlace page for the class. An interesting piece of feedback from students was that the majority of them expressed a preference for physical laboratories over using engineering software in the Soil Mechanics module. Specifically, it refers to an existing Soil Mechanics laboratory session where students physically measure the hydraulic conductivity of soil. This suggests that while computer-aided laboratory sessions can be valuable, they are not seen as a replacement for hands-on, physical laboratory work, in line with other studies in the literature (Hachich, 2012). Instead, these digital sessions are viewed as complementary, offering a different but useful way to enhance learning, rather than substituting the tangible experience provided by traditional laboratory setups.

There was strong agreement among students that Ansys technology could be beneficial for their future career, although many felt they were not yet competent in using all of its features. A special video was created to demonstrate the capabilities of Ansys Discovery to analyse 3D flow problems. Although the content of this video was not part of the laboratory assessment, many students attempted the instructions and expressed interest in applying the skills learned to real-world challenges, such as multi-stage dewatering techniques, 3D exclusion methodologies for seepage control, and groundwater management for 3D earth dams. Learning these topics typically requires strong visualization and creativity skills, which can be effectively developed through computer-aided simulations. A specific point noted by the instructor was that second-year students lacked sufficient mathematical knowledge to fully understand 2D FEM formulations. As a result, it was decided to introduce the fundamentals of FEM, such as 1D modelling of solid media, as early as the first year of study. This could be incorporated into first-year modules, such as "Engineering Mechanics 1" to establish a foundation for more advanced 2D modelling techniques in the later years.

Table 2. The summary of survey on students' perception for revised computer laboratory

Core areas	Questions	Agreement%
Available resources for Ansys learning	There were adequate resources available for me to learn Ansys effectively.	63%
	How beneficial were the activities and discussions during LAB sessions, facilitated by the instructor in reinforcing the pre-class content?	61%
	How effective did you find Ansys training videos in preparing you for your LAB-B?	59%
	Do you prefer to use engineering software instead of physical laboratory in Soil Mechanics modules?	58%
Ansys for future career	I believe that the Ansys software will be useful in my future career.	75%
	How confident do you feel in applying the skills gained through LAB-B to real-world problems?	70%
	This module gave me an understanding of how I can use Ansys software.	63%
	I now know how to use Ansys software for future projects.	53%

Figure 4. The detailed results of Survey

Finally, the results of the assessments for the Soil Mechanics module as a whole were obtained. Figure 5 shows student performance in terms of overall assessments (Figure 5a) and computer laboratory assessments (Figure 5b) across the 2023/24 and 2024/25 academic years. In terms of overall performance, the average marks were similar, with 60% achieved in the 2023/24 academic year and 62% in 2024/25. Notably, there was an increase in the number of high-achieving students in the 2024/25 academic year. In both academic years, computer laboratory assessments received high marks, with scores of 79% in 2023/24 and 69% in 2024/25. There are several reasons for the decrease in students' marks in the revised assessments. In some of the submitted assignments for the 2024/25 academic year, students were unaware that FEM solutions require proper legends, dimensions, and that the results are sensitive to the units of input parameters. In contrast, students in the 2023/24 academic year had better control over the layout of drawings and the units of input parameters when using spreadsheet-based solutions. To mitigate these issues in future delivery, it is recommended that clear guidelines and checklists be provided to students, emphasizing the importance of proper legends, dimensions, and consistent units in FEM solutions. Incorporating practice exercises on unit conversions, along with tutorial sessions and annotated examples, could further support students' understanding. Additionally, peer review, continuous feedback, and targeted software training may enhance students' ability to produce accurate and well-presented results. Additionally, although a free version of Ansys is available to students, most groups opted to use the version installed on the University virtual desktop. As a result, not all students could work with Ansys Discovery simultaneously due to the limited number of licenses available. Introducing basic Ansys features as early as the first year is expected to enhance learning outcomes.

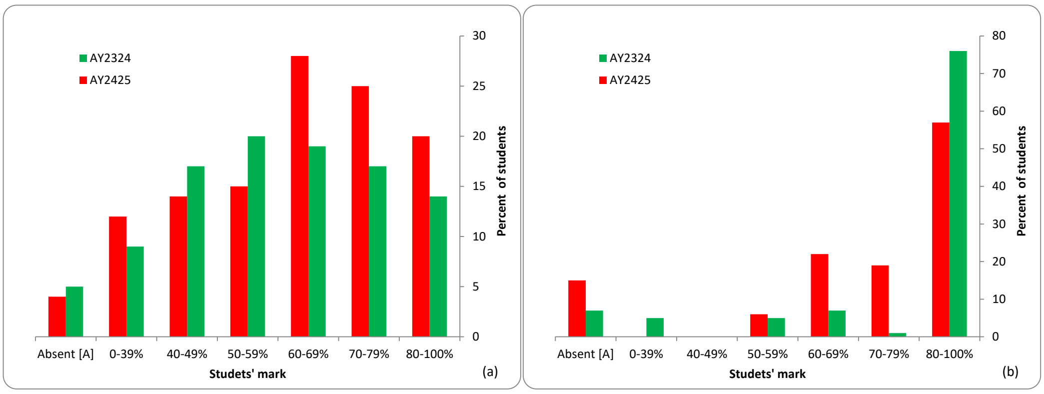


Figure 5. Students' performance across two successive academic years a) overall assessment b) computer laboratory assessments

The authors reflect on their initial experience integrating digital technology into a geotechnical engineering module. Their experience highlights that undergraduate students with limited background in FEM require structured support to grasp the concepts effectively. This can be achieved through clear, simple examples — such as the 1D bar problem — enhanced by strong visual tools provided by user-friendly software. The authors also align with students' feedback that virtual laboratories alone are insufficient to meet all learning objectives and should be complemented with hands-on, physical laboratory sessions.

The ultimate goal of this research is to embed digital technology, particularly computer-aided simulations using Ansys tools, into the existing curriculum of the Civil and Environmental Engineering (CEE) degree program. This will ensure that students develop skills and knowledge that not only align with academic objectives but also have practical industry applications. To achieve this, Ansys technology will be integrated into various CEE classes, enhancing students' learning experiences across multiple years. At the University of Strathclyde, Ansys will be utilized in advanced geotechnical engineering modules in years 3 and 4 (Geotechnical Engineering 1 and 2), as well as in Master's-level modules like Ground Improvement and Reinforcement. The software's capabilities, including elasto-plastic constitutive models such as Mohr-Coulomb, and its robust nonlinear solvers, make Ansys particularly suitable for routine geotechnical simulations. These include key tasks like slope stability analysis and bearing capacity simulations, which are fundamental for real-world geotechnical engineering practice. By incorporating these advanced tools into the curriculum, students will gain the expertise necessary for tackling complex engineering challenges in the industry.

6 Conclusion

This paper has presented a case study of technology-enhanced teaching and learning integrated into the existing curriculum of the 2nd year Soil Mechanics module at the University of Strathclyde. Ansys tools, including Ansys Workbench and Ansys Discovery, were employed in the computer laboratories to assist students in simulating 2D and 3D seepage problems. In the previous academic year (2023/24), the computer laboratories relied on a finite difference method implemented in spreadsheet software. The advantages and disadvantages of the old teaching approach have been discussed based on feedback from both students and instructors. In the updated teaching approach, Ansys tools were incorporated into computer laboratory sessions to challenge students with different 2D water flow problems and familiarize them with digital tools commonly used in industry. With Ansys Discovery, students were able to quickly evaluate the impact of design parameter changes on flow parameters, visualize flow lines and equipotential lines, and estimate total flow at the downstream boundary. The results from two surveys on overall student satisfaction and satisfaction with the computer laboratories were analyzed. The findings revealed a noticeable increase in overall student satisfaction in the current academic year compared to historical data (2023/24), particularly regarding the availability of enhanced learning resources. The survey on the revised computer laboratories also indicated that students recognized the value of learning cutting-edge technologies like Ansys simulations for their future careers, despite working with only limited features of the software. Furthermore, students expressed the importance of preserving physical laboratories alongside the use of simulation-driven technology. Comparing assessment marks across the two academic years, it was observed that students in the revised computer laboratories required additional technical support, such as troubleshooting sessions and earlier exposure to Ansys technology in the first year. To improve the overall student experience throughout the CEE program, there are plans to incorporate Ansys technology into several advanced geotechnical modules in years 3 and 4. This initiative aims to meet the increasing demand for professional geotechnical engineers skilled in numerical modelling and capable of managing complex geotechnical projects.

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Authors' bios

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Dr. Hamed Moghaddasi (PhD, CEng, MIEAust, MIMMM, FHEA) is a Teaching Fellow in the Department of Civil and Environmental Engineering. He obtained his MSc in Civil Engineering from the University of Tehran in 2013 and completed his PhD in Civil and Environmental Engineering at UNSW, Australia, in 2019. Prior to joining the University of Strathclyde, Dr. Moghaddasi worked as a Postdoctoral Research Associate in Geomechanics at Durham University. His research interests encompass soil-structure interaction, the mechanics of unsaturated soils, computational methods in geomechanics, and smart materials. Passionate about innovative teaching and learning strategies in higher education, Dr. Moghaddasi secured funding from Ansys as a principal investigator to integrate digital technology into the existing curriculum of the Department of Civil and Environmental Engineering. He was also awarded a teaching-research grant from the University of Strathclyde to introduce an AI-enabled computational toolbox into geotechnical engineering education.

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Maziar Moradi is a PhD candidate in the Department of Civil and Environmental Engineering at the University of Strathclyde. With a strong academic background in Rock and Soil Mechanics, he has developed a comprehensive skill set in Geomechanics through his bachelor's and master's studies. During his previous research, Maziar focused on estimating the wear of cutting tools used in tunnel boring machines. This work led to the development of an innovative testing procedure and device, enabling more accurate evaluation of tool wear. His research interests include the application of numerical methods to model complex geotechnical problems. For his PhD, Maziar is investigating the mechanical behavior of bimrocks, combining laboratory experiments with advanced numerical modeling.

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Alessandro Tarantino is Professor of Experimental Geomechanics at the University of Strathclyde in Glasgow, Scotland. Current research interests include the monitoring of the soil-plant-atmosphere continuum and the mechanical response of geostructures to climatic loading. He has led major European consortium research projects including the Marie Curie Industry-Academia Partnerships and Pathways 'MAGIC' (Monitoring systems to Assess Geotechnical Infrastructure subjected to Climatic hazards, 2013-2016) and the Marie Curie European Training Network 'TERRE' (Training Engineers and Researchers to Rethink geotechnical Engineering for a low carbon future, 2015-2019). He is editor of the book 'Laboratory and Field Testing of Unsaturated Soils' (2009). He has been keynote/theme lecturer at numerous International Conferences (the 8th International Conference on Unsaturated Soils in 2023 and the ICE Géotechnique Lecture in October 2023 the most recent ones) and has been ranked in the Top 2% most-cited Scientists Worldwide in 2023 & 2024 by Stanford University.

Bridget Ogwezi, Ansys, Inc., Cambridge, the UK

Dr Bridget Ogwezi is a Senior Project Manager on the Ansys Academic team, where she supports engineering education at universities worldwide. She holds a BEng in Civil Engineering from the University of Surrey and an Engineering Doctorate from the Technologies for a Sustainable Built Environment Centre at the University of Reading, completed in collaboration with BuroHappold Engineering. Leveraging her expertise in engineering and sustainability, she works closely with educators to enhance engineering courses and advance innovative teaching practices. In her role at Ansys, she oversees strategic partnerships with academic institutions that align with the company's mission to develop the next generation of engineers. Through these collaborations, she strives to equip students with the skills and tools needed to address real-world engineering challenges.