

An Innovative Course Structure to Teach Excel to Business School Students

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Abstract: Mastering Microsoft Excel is an essential skill for any business school student, whether during their studies, their internships, or their future jobs. This competency is difficult to teach as many students think they master the software when they only use a tiny part of it. In this paper, we will describe an innovative course we've created to train a large group of students in our business school. This course combines e-learning paths, online synchronous sessions, and an adapted support. Having taught this course for several years, we will first describe the first sessions of the course. After these sessions, we observed that as some students are aware of the necessity to develop their skills, some others are not involved at all in the process. Following these sessions, we introduced some evolutions we will present. These evolutions improved the course. We will describe these evolutions and present the results on students' training. Finally, we will present the future developments we plan to implement for next year.

Keywords: Hybrid, Innovative course, Excel teaching

1. Introduction

Microsoft Excel is a tool used widely in companies. Whether in scientific disciplines or in management, this software is a standard in most professional activities. With this tool, the user can organize data, make calculations, have a graphic representation of data, and have some statistical analysis. In the management field, Excel is widely used in accounting, finance, operations management, logistic or marketing for example. Whatever path a student chooses, this skill will be a strong asset for their future (Bell, 2000).

Paradoxically, most students are not formally "trained to use or design spreadsheets" (Madahar, 2011). A survey was made by this author, showing that 77% of Tuck Business School Alumni consider they have a large experience in Excel but they lack expertise. This might lead to critical errors in the decision-making process (Frownfelter-Lohrke, 2017).

In this article, we will describe a course we developed for master's students in a business school. The particularity of this course is the large cohort of students concerned. In a first part, we will describe the course as it was first developed. We will analyse the results and feedback of this first year. We will then explain how the course evolved in the following years. We will then focus on the tutoring proposed to students during the course. And in a last part, we will explain the improvements we plan to implement.

2. Design of the First Version of the Course

Our business school proposes several programs: a global BBA, a master's degree, several master's in science, MBA programs and a PhD program. In this article, we will focus on an Excel course created specifically for the master's degree program. An Excel course existed in the curriculum a few years ago. It was abandoned regarding the lack of involvement of students. But progressively, a demand of new students to have a course on this topic emerged. The particularity of this program is the large cohort of students in first year: about 1200 students. These students come from diverse backgrounds: almost half of them followed a typically french curriculum called "Classe Préparatoire" (Draelants & Darchy-Koechlin, 2011). This curriculum is an intensive two-year program that prepares students for competitive entrance exams for admission to prestigious higher education institutions in the engineering field or in business schools. The other students have studied two years in classical higher education institutions. This diversity of profiles makes it impossible to know their levels in digital tools.

The objective of the course is to give all students the skills to use Microsoft Excel in a professional manner.

For the first year, in 2021-2022, only students from "Classe Préparatoire" were following the course. 597 students were registered, and they were divided into 16 groups. We studied the literature to determine which solution will be the best for this course format. Weller (2004) identifies five models to cope with large cohort courses:

- Low support model, in which there is low or no contact with the teacher. This is mainly used with web-based training materials, in the Information Technology trainings.

- Hierarchical support model, consisting of specific teaching materials supported by part-time tutors.
- Expert plus part-time support, which is similar to large lecture hall approach. The teaching is handled by the expert and the support is provided by part-time tutors online.
- Automatic creation of personalized courses, using learning-objects automatically combined to meet the needs of each learner.
- Peer-supported community model, which relies on dialogue and support between learners.

As this classification shows, support is the main challenge for large cohort courses. Blended courses combine several of the models described by Weller. It allows to maintain support and retention in large cohorts (Nagel, 2010).

The course we describe in this article was combining, in its first version, an e-learning track and online synchronous teaching sessions. This structure was completed by the support of a teaching assistant. As stated by Nagel (2010), several studies show the importance of employing a teaching assistant to guarantee the success of large cohort classes.

The e-learning track is provided by an editor who proposes e-training programs and certifications. The Excel e-learning program is composed of three different levels. The first one is about the basics of Microsoft Excel: create a table, make simple calculations, display data, and manage worksheets. The second level refers to more complex tables, graphs, data lists and pivot tables. And the third level deepens the content by focusing on advanced functions and security. This e-learning solution was chosen for its interactive functionality. It's combining pedagogical videos with practice in a virtual environment. The feedback to students is immediate and they have the possibility to repeat the exercises as many times as needed. The e-learning solution by itself can be considered as a low support model pedagogy. But we decided to add online synchronous sessions with Professors to add some specific exercises and create dialogues with students.

We developed four sessions of three hours with specific contents to deepen the training but also to focus on management topics:

- Session 1: Introduction to Microsoft Excel, basic calculations, table formatting, data importation, data types and exportations.
- Session 2: Graphs, data visualizations and descriptive statistics.
- Session 3: Financial functions and conditions.
- Session 4: Database, sorting, filtering, solver and scenario manager.

Four Professors were involved in the teaching of these sessions, each professor teaching to four groups of students. The evaluation of the course was composed of: results to the e-learning tracks (30% of the grade), four intermediary quizzes (30% of the grade) and a final quiz (40% of the grade). A bonus point was also added to very involved students.

The following figure describes the course structure:

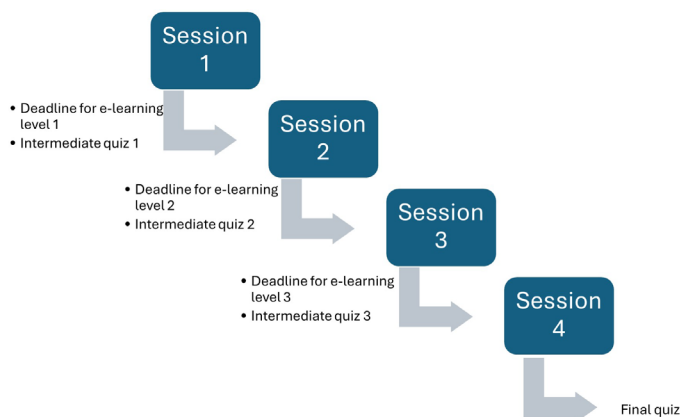


Figure 1: Initial course structure

On the 597 students registered to the course, 536 students validated the course and 57 of them had to pass a catch-up exam. 12 students didn't participate to the catch-up exam and 5 failed to pass it. You can look at the average grades for all the evaluations in the following table (grades are upon 100):

Evaluation	
<i>E-learning Level 1</i>	90,22
<i>E-learning Level 2</i>	77,80
<i>E-learning Level 3</i>	72,17
<i>Intermediary Quiz 1</i>	62,24
<i>Intermediary Quiz 2</i>	58,71
<i>Intermediary Quiz 3</i>	59,21
<i>Final Quiz</i>	68,79
<i>Final Grade</i>	69,55
<i>Catch-up exam</i>	49,17

Figure 2: Grades in 2021-2022

The results are very good for level 1 and decrease in level 2 and 3 of the e-learning tracks. The increasing difficulty of the levels is clearly visible in these grades. These results show that the e-learning is effective to teach students how to use Microsoft Excel. It allows “self-pace learning and remote access to large number of students” (Mio et al, 2019).

In our course, e-learning practices can be repeated as many times as needed. By practicing enough, all students should be able to have high grades in this part of the course. This is quite different for quizzes, for which students can answer just once for each question. And for this part, it appears that grades are ranging from 58 to 68 out of 100 points. These being averages, we can see that quite a lot of students had difficulties answering the questions of the quizzes.

The synchronous sessions were taught online using Zoom software. Before covid, online courses were quite rare in France (Billouard-Fuentes, 2020). Since then, it has become more frequent, but it remains challenging to create interactions and students’ involvements during these courses. The four professors who taught these sessions were unanimous: few students were involved, and the most participative ones were the best ones. This lack of investment relies on the topic of the course itself. Most students know how to create tables in Microsoft Excel, this leads them to believe that they master the software. But they might create tables containing errors (Frownfelter-Lohrke, 2017). There is a huge gap between the perception students have of their knowledge in Excel and the perception faculty have (Ramachandran Rackliffe & Ragland, 2016).

This first version of the course was quite successful but was a bit deceiving for the professors involved.

3. Course Expansion and Adaptation

For the first year, the course was taught only to students coming from “Classe préparatoire”. The second year, the program decided to display the course to all first-year students. The number of students was then 1.120, making necessary an evolution of the course.

The four professors involved the first year all agreed that the synchronous sessions were not very useful. The students who needed them were not involved and the students involved already had a good mastery of Microsoft Excel. The synchronous sessions facilitated interaction, but they did not create an affective learning climate, as only good students were feeling well enough to participate. As stated by Boelens et al. (2017), this climate is one of the key challenges in an online environment.

For the second year, we decided to focus the course on the e-learning tracks and to reinforce the tutoring. The grade was then composed of two parts: the e-learning tracks and a final quiz. Both were counting for 50% of the final grade. The average final grade was 86,67 upon 100, when it was 69,55 the precedent year. This might suggest that it was easier for students to validate with this new format. But if we look at the grades in detail, the explanation is quite different.

Evaluation	2021-2022	2022-2023
<i>E-learning Level 1</i>	90.22	98.05
<i>E-learning Level 2</i>	77.80	95.24
<i>E-learning Level 3</i>	72.17	93.84
<i>Final Quiz</i>	68.79	77.67
<i>Final Grade</i>	69.55	86.67

Figure 3: Comparison of the grades between year 2021/2022 and year 2022/2023

As you can see in this table, the average grades in the e-learning tracks have increased significantly for all levels. The most impressive is the level 3 for which the average grades were 72,17 in 2021/2022 and rise to 93,84 in 2022/2023. As we said before, students can retake the e-learning exercises as many times as needed to validate them. By increasing the weight of the e-learning tracks in the final grade, students were more involved than the precedent year. This can be seen also in the results of the final quiz, for which the average grade increased from 68,79 to 77,67 upon 100 points.

This new format appeared to be quite efficient as students were more involved in the e-learning tracks. But the pedagogical team identified a new behavior in students: some students decided to stop working in the e-learning when they considered that the validation of the course would be guaranteed even if they have a bad grade at the final quiz. Thus, 3 students validated only the first level of the e-learning and 21 students validated the two first levels and didn't work on the third one! Two of these students didn't pass the final quiz. But for the others, they got very good results with an average of 77,67 to the final quiz. Those students decided to focus on the grade, but they miss all the content of the level 3 of the e-learning. This is a shame, especially because these students have a good level in Excel and could have improved further.

After this second year, the pedagogical team was satisfied of the results, especially with the increase in the size of the cohort. But it was a little disappointing to see that some students had not taken full advantage of this opportunity to improve their skills.

That's the reason why, for the third edition of the course, they decided to change the rules. The content of the course and the evaluation scheme remained the same, but they added a new constraint. To be authorized to access the final quiz, students must have obtained at least 75% to all the three levels of the e-learning tracks. This instruction was given at the beginning of the course and repeated several times during the course.

For this third year, 1.176 student followed the course. 37 didn't validate it. Amongst those students, 29 of them were not authorized to pass the final quiz. You will find the comparison of the grades for the three first cohorts of this course:

Evaluation	2021-2022	2022-2023	2023-2024
<i>E-learning Level 1</i>	90.22	98.05	98.53
<i>E-learning Level 2</i>	77.80	95.24	96.74
<i>E-learning Level 3</i>	72.17	93.84	96.01
<i>Final Quiz</i>	68.79	77.67	69.62
<i>Final Grade</i>	69.55	86.67	83.34

Figure 4: Comparison of the grades for the three cohorts

As you can see in this table, the results are quite similar for the e-learning tracks between year 2022/2023 and 2023/2024. This new format is functioning well and the new restriction for passing the final quiz was effective. The decrease of the average grade for the final quiz can be explained by the fact that some students were not allowed to take the quiz and had a grade of 0.

This analysis is confirmed by the standard deviation of these grades. The following table shows the standard deviation for the three cohorts:

Standard deviation	2021-2022	2022-2023	2023-2024
<i>E-learning Level 1</i>	24.99	11.27	8.21
<i>E-learning Level 2</i>	32.43	13.94	10.42
<i>E-learning Level 3</i>	38.28	19.72	12.16
<i>Final Quiz</i>	16.95	15.94	17.65
<i>Final Grade</i>	16.96	11.98	12.02

Figure 5: Standard deviation for the three cohorts

As this table shows, the standard deviation for the e-learning levels is decreasing year after year. This reflects the fact that grades close to 0 and under 75 upon 100 gradually disappear. The new version of the course allows a greater involvement of students and above all reduces the number of students not getting involved at all. This can be visualized in histograms. We present here only the third level of the e-learning track, but the same conclusion can be seen for the other levels.

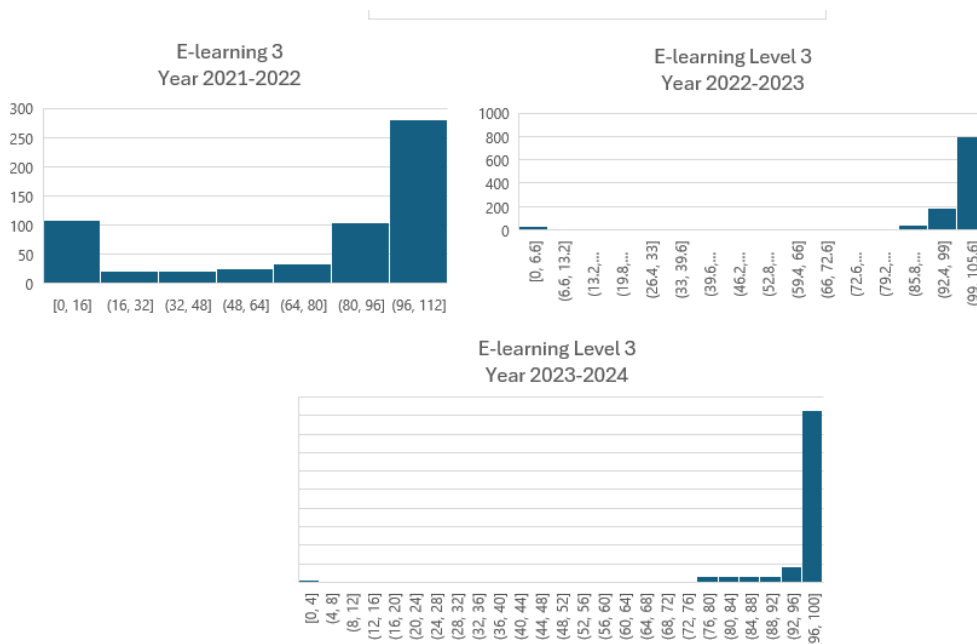


Figure 6: Histograms for e-learning level 3

4. Students' Tutoring

In this part, we will focus on the current version of the course. The course is mainly composed of an e-learning content. But students need to be supported to succeed.

Since the second session, the course is managed by one professor, and one tutor. At the beginning of the course, an introducing video is recorded by those two people to explain the rules, the e-learning's tracks, and the evaluations. This video is displayed on the LMS of the school and should be watched by every student. In this video, the professor also explained how students should behave if they have questions. With a large cohort like this one, many students ask the same questions or have the same issues. The team decided to use the forum tool of the LMS to centralize the questions and answers. The procedure to follow for students is: first, to look at the forum to check if the question was already answered. If not, the student was supposed to write to the tutor, who was responsible for answering the question and adding it in the forum. This worked for most of the students. But the professor and the tutor still received many emails. Some of them were related to the content of the e-learning course, but quite a lot of them were related to technical issues. It was surprising to see that many students don't have a good knowledge of the functioning of their own computer. Another surprising element was the fact that students were writing either to the tutor, to the professor or to both. It was clearly indicated that they were supposed to contact the tutor first. Tutoring is a crucial pillar to guarantee the success of an online course (Noam, 1995). But in the French context, it appears that students are not familiar with this new role. Tutoring (or mentoring) is a very good solution to create and maintain interactions during online courses (Glazier, 2021). As professors have many responsibilities and courses, tutors have more time to create interactions during e-learning paths. In our Excel course, we also decided to have some office hours for students. Two sessions of office hours were proposed each week during the course: one face-to-face, and one by videoconferencing. It appeared that this option was not widely used by students although it would have made it possible to create interactions and an affective climate. But some students might be afraid to contact tutors (Klimova & Poulova, 2011).

Several options can be used to communicate with large cohorts of students. In our course, we decided to use forums, but other solutions as blogs can also be used (Farmer and al, 2008). Forums were used successfully in other contexts (Power, 2014). But in our case, most questions were too specific to feed the forum. Some students have technical issues, and it needed several emails or a discussion with the tutor to solve the issue. Students frequently wrote emails during the weekends. They were benefiting from being at their parents' home, with a good internet connection, to work on the e-learning tracks. The tutor and the professor were not always available to answer questions during weekends. This was not good for students' motivation.

5. Future Evolutions

During the three first sessions, we collected many questions and solved several technical issues. Relying on this knowledge, we decided to develop a new tool for the next session: a chatbot.

A chatbot is “a conversational agent that interacts with users using natural language” (Abu Shawar & Atwell, 2015). Chatbots are becoming more and more common in higher education, either for teaching purposes or for service purposes. In both cases, they improve efficiency and timeliness in answering students’ questions (Abbas et al, 2022). In the Excel course, we decided to create a chatbot to answer generic questions, and to give students the opportunity to send an email if the chatbot is not able to answer them correctly. Atmosukarto et al (2021) developed a chatbot for a chemistry course. In their study, they collected quantitative feedback on a Beta Testing version of the chatbot. Most feedback were positive, as the chatbot was clearly answering questions, was easily accessible and some of them also indicated that they were less shy to ask questions to a chatbot than to a human tutor. The authors identified some limitations: sometimes the answers are not clear enough for students, some content is missing and sometimes the chatbot was unable to understand the question of the student. These limitations are very important for us as we will try to avoid them when creating the chatbot for our course.

We will use the chatbot component of Powerapps to create the chatbot. Powerapps is a low-code platform proposed by Microsoft. This tool is available in our school and the chatbot can be implemented in Teams to give an easy access to students. We plan to implement it for the next session in September 2024.

6. Conclusion

Teaching to large cohorts of students is challenging. In this article, we describe a course created to teach Microsoft Excel to master’s degree students. Starting with a cohort of almost 600 students, the pedagogical team is now managing cohorts of almost 1.200 students. For the first session, the team used a blended approach combining e-learning tracks and online synchronous sessions. At the end of this session, it appeared that the synchronous sessions were not useful as only the best students were participating.

For the two next sessions, we focused the course on the e-learning tracks and students were more involved in it. The succession rates rise but the communication with students was not optimal as they sent email either to the professor or the tutor.

For next session, we decided to develop a chatbot to answer more effectively to students’ questions. This should improve the responsiveness and efficiency of answers.

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