Introducing new French-Speaking Users to LaTeX Quickly and Convincingly

Abstract

For four university years, we had to introduce 2nd-year university students in Mathematics to LaTeX. An important goal was to make them able to use LaTeX when they are given some long homework in Mathematics the year after (3rd-year university). This teaching unit only included lab classes and was 15-hour long. We present our approach in detail and explain how it was perceived by students.

Keywords

Teaching LaTeX, successive steps of a course, lab-class-based curriculum, students' perception

Introduction

When LaTeX [22] came out, it was sometimes viewed as a program hard to use, except for computer scientists familiar to hermetic programming languages. However this word processor has become more and more well-known as a powerful tool that produces high-quality print outputs. Besides, beginners can learn it now with many books introducing it, in many languages, some—non-limitative—examples are [12] in English, [3, 21, 29] in French, [26] in German, [4, 33] in Hungarian, [6] in Polish, [30] in modern Greek, . . . In addition, some universities propose introductions to LaTeX within their *curricula*. An example is a unit—entitled *Scientific Tools*—we taught for four academic years (2004–2008), at the Faculty of Science and Technics, part of the University of Franche-Comté and located at Besançon, in the East of France.

Students who attended this unit were in the 2nd academic year of Mathematics[1]. Besides, one goal of this teaching unit was to ease the writing of an important homework the year after, that is, within the 3rd academic year in Mathematics, so a substantial part of this unit should have been devoted to LaTeX's math mode. Let us make precise that this teaching unit was not optional, that is, all the students had to attend it, even if they were not convinced of LaTeX *a priori*. Of course, some heard about it, some did not. This unit only included lab classes and was 15-hour long. So students actually practised exercises in LaTeX, but we did not have enough time to show very advanced features.

We think that the approach we follow is interesting. In a first section, we make explicit our requirements and the pitfalls we wanted to avoid. Then we show the broad outlines of the steps of our unit and summarise the experience we got. Of course, reading this article only requires basic knowledge about LaTeX.

What to do? What to avoid?

Many introductions to LaTeX begin with typing a small text and enriching it, some examples are [4, 21]. Our starting point is that this *modus operandi* has too many drawbacks, especially for non-English-speaking future users, in particular for French-speaking ones. First, only a few students are familiar with typing texts quickly and intensively, even if some have already used computers. They may do some typing mistakes in command names. Of course, any LaTeX teacher is able to fix them, but the price to pay is loss of time and dynamic. Besides, students need to be convinced of LaTeX since their first experiments. They should see that this word processor is suitable for large-sized texts, at the beginning, they should be able to observe that it is easy with LaTeX to apply some changes related to layout: changing characters' basic size, switching one-column and two-column layouts,. . . All these goals can be reached only if students are given a text already typed and ready to be processed. That is, compiling this text is successful at the first time, so there is no anxiety about this point.

Besides, let us not forget that the most natural choice for a text to be typed by French students is a text in French. But some typographical rules are different from English ones: for example, a thin space—produced by the LaTeX command '\ ,'—is to be put just before a 'high' ponctuation sign[2], such as an exclamation or question mark[3]:

Joie, bonheur et délectation !

whereas the same signs are glued to the preceding text in English:

there was a lot of fun!

That is, such ponctuation signs should be *active*[4] within French fragments. Of course, the simplest solution to this problem is to use the babel package's french option [24, Ch. 9]. So, end-users can type 'Vous␣comprenez?' or 'Vous␣comprenez␣?' and the results will be typeset correctly in both cases:

Vous comprenez ?

This point may seem to be digressing, but our purpose is to show how difficult the beginning of an introduction to LaTeX for non-English-speaking people is. Teachers are placed in a dilemma: either students have to typeset texts peppered with commands such as '\'' or '\,', or they should be given a big preamble, consisting of many \usepackage directives, with an advice such that 'You will understand later'[5]. In the case of the French language, this point is enforced because of accented letters: the most frequently used are directly provided by French keyboards—for example, 'é' or 'è', very frequent within French words—but unusable if the inputenc package has not been loaded with the latin1 option [24, § 7.11.3]. If French students begin to learn LaTeX by typing their own texts, no doubt that these texts will contain accented letters.

Anyway, the best solution seems to be a complete text—in French or in English—and students can perform first exercises by changing some sentences or adding some short fragments. Students can put down some simple sentences in English, so writing in this language avoids some problems related to French typography. When they are got familiar with the commands of LaTeX and its 'philosophy', the tools usable to write in the French language—the babel and inputenc packages will be introduced. From our point of view, a 'good' text, usable as a starting point, should provide the following features:

☐ a title, author, and date identified, so students can learn about commands such as \title, \author, \date, and \maketitle; an annotation may be a pretext for introducing the \thanks command;
☐ an average-sized text;
☐ a command used without argument, in order to show that a space character following a command's name without explicit delimiter is gobbled up;

☐ a word hyphenated incorrectly, so students can realise that some words may be hyphenated, and learn how to fix such a mistake, even if that is rare;
☐ a pretext for introducing a new command in LaTeX,
☐ a pretext for introducing cross-references.

The steps of our unit

The source text given to students is [9]. More precisely, the first version, giavitto.tex, does not use the babel package, even if this text is in French, with a short introduction we wrote in English. The inputenc package is not used, either, so we used TeX accent commands, and 'high' ponctuation signs are explicitly preceded by a thin space, e.g.:

```
Joie, bonheur et d\'{e}lectation\,!
```

This text, a criticism about a book, came out in a forum. It has seemed to us to be very suitable for such an introduction to LaTeX, because:

☐ it is 3-page long, that is, a small-sized text, but not too short;
☐ the introduction's second paragraph reads:

```
... using the \LaTeX\ word processor...
```

☐ without the babel package's french option, there is a word hyphenated between a consonant and the following vowel, what is incorrect in French[6]: 'ex-emple' (for 'example', hyphenated as 'ex-ample' in English) should be hyphenated as 'exem-ple'[7];
☐ in this text, some words need emphasis stronger than what is usually expressed by italicised characters: in the original text, typeset using only the standard typewriter font[8], these words were written using capital letters:

Comment pouvait-IL savoir cela ?

The source text reads:

```
Comment pouvait-\superemph{il}...
```

and we can illustrate the use of variants of this new command \superemph:

```
\newcommand{\superemph}[1]{\uppercase{#1}}
\newcommand{\superemph}[1]{%
 **\uppercase{#1}**}
\newcommand{\superemph}[1]{**\textsc{#1}**}
...
```

That allows a kind of '*semantic markup*' [16], in the sense that this markup is related to a semantic notion, rather than some layout.

The first exercise is to compile the source text of this first version giavitto.tex, the second is to play with some options of the `\documentclass` command: twocolumn, 12pt, ... so students can see that adapting a document to different layouts is easy. Guidelines are given in [14]. To sum up the order we follow:

☐ basic notions: commands, environments, preamble;
☐ sectioning commands: `\part`, `\chapter`, ...
☐ parsing problem about commands without right delimiter (*cf. supra*);
☐ formatting environments: `center`, `flushleft`, `flushright`;
☐ changing characters' look: commands and environments such as `\textbf` and `bfseries`, `\textsf` and `sffamily`, ...
☐ introducing and redefining new commands: `\newcommand` and `\renewcommand`, use of 'semantic' markup, by means of commands such as `\superemph` (*cf. supra*), 'local' definitions—surrounded by additional braces—vs global ones;
☐ changing size: commands and environments `small`, `footnotesize`, ...
☐ list environments: `itemize`, `description`, `enumerate`; counters controlling `enumerate` environments, difference between redefining *values* and *look*—e.g., as done respectively by the commands `\enumi` and `\labelenumi`—insertion of footnotes;
☐ introducing *packages*: examples are indentfirst[9] [24, p. 32] and eurosym [24, pp. 408–409];
☐ notion of *dimensions*, how the page layout parameters are defined [24, Fig. 4.1] and how to customise them;
☐ how texts (resp. successive lines) are split into lines (resp. pages), useful commands such as `\-`, `\linebreak`, `\pagebreak`, `\smallskip`, `\medskip`, `\bigskip`, putting unbreakable space characters by means of the '~' input character;
☐ management of *cross-references* and introduction of *auxiliary* (.aux) files, commands `\label`, `\ref`, `\pageref`; use of an additional .toc file for a table of contents and `\tableofcontents` command;
☐ introducing some basic differences between French and English typography; then we show how the babel package allows LaTeX to typeset texts written in many languages, possibly within the same document; introducing some useful commands of the babel package's french option; the 'standard' preamble of a LaTeX document written in French is given:

```
\documentclass{...}

\usepackage[...,french]{babel}
\usepackage[T1]{fontenc}
\usepackage[latin1]{inputenc}
...
```

(see [24, §§ 7.11.3 & 7.11.4] about the packages fontenc and inputenc); as an example taking advantage of LaTeX's multilingual features as much as possible, a second version of [9], giavitto-plus.tex, is given to students;
☐ the document's end is devoted to some complements not demonstrated in lab classes: some converters to HTML[10] (LaTeX2HTML [10, Ch. 3], TeX4ht [10, Ch. 4], HyperLaTeX [18]), BiBTeX [27].

Of course, students are not required to master all these items: we make precise the points students must know, and other information is given as a *memorandum*, e.g., the list of commands changing characters' look. A second document [15] is devoted to math mode and is organised as follows:

☐ math mode vs text mode;
☐ spacing in math mode;
☐ commands changing characters' look in math mode, e.g., `\mathrm`, `\mathit`, ..., additional packages such as amssymb or euscript[11];
☐ commands producing Greek letters for mathematical purpose (`\alpha`, ...) and symbols (`\leftarrow`, ...) in math mode;
☐ subscripts, superscripts, fractions, radicals;
☐ adjusments: commands `\displaystyle`, `\textstyle`, ..., operators *taking limits* or not, horizontal and vertical *struts*, amsmath package's `\text` command;
☐ definition of operator names, by means of the commands `\mathop`, `\DeclareMathOperator`, `\DeclareMathOperator*`, `\mathbin`, `\mathrel`;
☐ *delimiter* management, by means of the commands `\left`, `\middle`, and `\right`;
☐ environments `cases` and `equation`; more features belonging to the amsmath package, such as the environments `multline`, `split`, `gather`, and the commands `\tag`, `\intertext`;
☐ environments belonging to LaTeX: `eqnarray`, `eqnarray*`;
☐ environments useful for general matrices

([b|p|v|V]matrix) and arrays ([sub]array), packages multirow, [del]array;

- □ back to LaTeX's text mode and introduction of the `tabular` environment.

Two other documents gently bring this unit to its end:

- □ [28] introduces pdfLaTeX and the hyperref package [10, Ch. 2], taking as much advantage as possible of the features of the PDF[12] format related to hyperlinks;
- □ [1] is devoted to image insertion, by means of the packages graphic(s|x) [24, § 10.2].

Of course, all these documents include references—possibly on-line—that allow readers to learn more.

Lessons learned

Teaching this unit gave good results: it actually seemed to us that students really enjoy discovering LaTeX and using it. Generally they got nice outputs. In addition, practising LaTeX's math mode caused them to realise how diverse 'graphical' expressions of Mathematics are. For example, 'modulo' is both an infixed and prefixed operator, as reflected by the two commands \bmod and \pmod. Likewise, the notion of operators taking limits separates the layout—the places of each information—and the common notion—an interval's endpoints. That is, the commands of LaTeX's math mode may be viewed as *presentation markup*, comparable to the namesake notion in MathML[13] [32, § 2.1.2].

Anyway, let us recall that we taught students in Mathematics. Such students learned the bases of a programming language[14], but do not plan to become computer scientists. So, they did not get used to present programs nicely, by indenting them, as students in Computer Science learn to do, in order to be able to work on them again. A good exercise to emphasise this point is first to give students a complicated formula to be typeset, then to ask them to change it.

Teachers have to give some advice about organising LaTeX source texts. For example, there should be no other word on a line containing \begin or \end commands delimiting environments , and nesting environments should be made clear by indenting them:

```
... text before.
\begin{itemize}
␣\item ...
␣\begin{itemize}
```

```
␣␣\item ...
  ...
 \end{itemize}
\end{itemize}
Text after...
```

Some notations should be avoided when a more systematic markup is available. For example, we think that it is better for students to get used to put down:

```
\begin{small}
...
\end{small}
```

than '{\small ...}'. Of course, the latter may appear as simpler for short fragments, but any TeXnician knows that it is possible to use a command like \small command without additional braces, in which case, this size change runs until the next size change command. If the markup associated with a command is not clearly expressed, some students may be baffled. Besides, let us consider three versions of a end-user defined command typesetting a note using small-sized characters:

```
\newcommand{\note}[1]{%
 \begin{small}#1\end{small}}
\newcommand{\noteone}[1]{\small#1} % Wrong!
\newcommand{\notetwo}[1]{{\small#1}}
```

Of course, any LaTeX teacher can explain why the \noteone command does not work as expected, and how to fix this wrong definition as done for the \notetwo command. However, a user who get used to use small as an environment—rather than '{\small ...}'—would probably put down this \note command as we did, and that is indisputably the simplest solution. The commands and environments introduced by the LaTeX format have homogeneous taxonomy about delimiting arguments and effects. That is, the markup is very clear, in particular for beginners. That may not be the case for commands originating from TeX's basis: for example, if you would like to put a vertical strut whose length is given, we can use the construct \vbox to 1.1\baselineskip{} [15, § 2.7], that is, using a kind of *mixfixed* markup. Of course, dealing with such a command is rare. But other commands belonging to *plain TeX*'s math mode, such as \over or \atop, are error-prone since they have no argument and are only related to positional relationships. Let us compare plain TeX's \over command with LaTeX's \frac, that has 2 arguments: the source texts for the numerator and denominator[15].

Last but not least, we notice some points related to the implementation we used: TeXnicCenter [31],

built out of the MiKTEX typesetting engine [23], and running under the Windows operating system. This graphic interface is very good, expecially the correspondence between the editor's cursor and a marker on the resulting .dvi[16] file. The main drawback is that MiKTEX runs in non-stop mode. As a consequence, students may get almost complete texts in case of recoverable errors. So they do not have to be aware of their errors and they perceive only 'serious' ones. It is needed to introduce them to .log files, and ask them to tolerate only warning messages.

Conclusion

LaTEX being extensible because of its numerous packages, it is impossible for an initiation course to give all the functionalities that already exist. In fact, teachers also have to show how to use LaTEX's documentation—good documents exist in French—how to learn more. But it is essential for students to understand LaTEX's philosophy and get good methods. We think our method fulfills these goals. From 2003 to 2005, J.-M. Hufflen taught 4th-year university students in Digital edition[17], at the Letter Faculty of Besançon, and got first experience for writing [14]. A more concise document [2] has been used by A.-M. Aebischer for analogous introductory courses given at the IREM[18] institute for future teachers in Mathematics.

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Notes

1. '*License 2, parcours Mathématiques et Mathématiques appliquées*', w.r.t. French terminology.
2. This notion of 'high' sign of ponctuation belongs to French typography's terminology. A short survey of these rules is given in [5, §§ 9.21–9.33], a more complete reference is [13], in French.
3. The following quotations come from [9].
4. This notion is explained in [20, Ch. 7].
5. So do [3, 6, 26, 30]. The first example of [33] does not use any package, the `\usepackage` command being introduced immediately after. In addition, examples given at first are small-sized, so introducing some variants—e.g.,

twocolumn vs onecolumn—would not be very convincing. On another subject, French texts can be typeset using the packages french(pro||le) [7, 8], as alternatives of the babel package, but the problem of introducing such a package since the course's beginning remains the same.
6. Except for etymological hyphenation, now hardly used in practice.
7. In fact, this point is debatable, because some French typography manuals consider that a word should not be hyphenated before a silent syllabe—'*exemple*' sounds as [εgzɑpl]. (That is why this word is not hyphenated in the version processed with the babel package's french option.) But these typography manuals mention that this convention is difficult to follow, in particular when text columns are narrow, as in daily newspapers, for example. More details about this point can be found in [11].
8. Let us recall that this text came out in October 1986, the interfaces used within forums was not comparable with Web's.
9. Indenting the first paragraph after a display heading is more current within French texts than within English ones, so introducing this indentfirst package is relevant in our unit.
10. **H**yper**T**ext **M**arkup **L**anguage, the language of Web pages. [25] is a good introduction to it.
11. Most of the math mode's advanced features are described in detail in [24, Ch. 8].
12. **P**ortable **D**ocument **F**ormat, Adobe's format.
13. **MATH**ematical **M**arkup **L**anguage [32] is an XML (e**X**tensible **M**arkup **L**anguage) application for describing mathematical notation regarding either its structure or its content. Let us mention that MathML's broad outlines are taught to 5th-year students in Statistical Modelling ('*Master 2 de Mathématiques, mention Modélisation statistique*', in French) [17, ch. 9], as part of a unit entitled 'Software Engineering'.
14. Java [19], in the *curricula* of the Faculty of Science and Technics located at Besançon.
15. As mentioned in Note 13, there is an introduction to MathML for some 5th-year university students in Mathematics. MathML's content model [32, § 2.1.3], more related to the semantics of mathematical expressions, is easier to understand for these students than the presentation model.
16. **D**e**V**ice-**I**ndependent.
17. '*Master 1 d'Édition numérique*', in French.
18. '*Institut de Recherche sur l'Enseignement des Mathématiques*', that is, 'Research Institute about teaching Mathematics'.

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