



## INTRODUCING LATEX TO UNDERGRADUATE STUDENTS FOR FINAL YEAR PROJECT REPORT IN COLLEGE OF ENGINEERING

**F. Abdullah**

*College of Engineering, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia*

**N. I. M. Rawi**

*College of Engineering, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia*

**A. Ismail**

*College of Engineering, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia*

**N. A. M. Radzi**

*College of Engineering, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia*

**S. K. Ahmed**

*College of Engineering, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia*

---

### ABSTRACT

*Report writing is one of the skills necessary for engineering students to master. There are various computer-aided tools for them to choose from. LaTeX is one of them. We have formed a committee in College of Engineering, UNITEN called TuG@UNITEN with objective to introduce and expose students to LaTeX. The committee has conducted numerous workshops for final year students in the college every semester, separating them to two groups according to course taken, either FYP1 or FYP2. This paper will discuss about the resources used in conducting the workshop. Recommendations were presented based on the experience for others to look.*

---

**Keywords:** LaTeX, Report writing, Soft skill, Undergraduate.

### 1. INTRODUCTION

Writing a report is something that an engineering student must do. From a simple one page report, formatted lab report to book length final year project report, it is a part of an engineering students life. There are two aspects students have to consider in report writing. One is the content, which is the most important. The other is formatting of the report, which is not so important but still need to be given attention. Majority of the students did not pay enough attention to what is necessary in writing the report. Some will pay too much attention to content to the point that the formatting is totally neglected. Some will try to balance between both but end up taking more time to finish the report. A poorly written report, regardless of poor in term of content or in term of formatting, both will took more time from supervisors to check the report.

LaTeX is a computer typesetting algorithm created for producing specific format manuscript exactly the same over and over. It is used in many institution of higher learning for various applications, not just thesis and article paper only (Almstrum et al., 2001), (Fox and Hackerman, 2001), (Gray and Costanza, 2003), (Havill and Ludwig, 2007), (Loch, 2005), (Scales and Ecke, 2002). The strong point of LaTeX is its processing power to produce beautiful mathematical formula output and keep track of all cross-referencing and citation almost automatically. Other advantage is that the software needed is distributed for free under GNU public license. Besides that, the software also can run on multiple platforms without sacrificing the quality of output.

With all the advantages listed above, LaTeX should be the software of choice for document processing purpose such as project report and thesis. However, it is not the case, at least in UNITEN. The major drawback of LaTeX is that it is code base software, where user has to write codes to produce documents. Figure 1 shows a sample code that produces an article according to a publisher's requirement. The format selected was *IEEEtran* class file where it will control the style of the output in accordance to stipulated format. *lipsum* is a package to generate dummy text used in the sample. The same also true for thesis class, where all typesetting requirement is set in the class file, leaving only the content for students to worry about.

**Figure-1.** Sample LaTeX code for manuscript according to IEEE format

```
\documentclass[a4paper,12pt]{IEEEtran}
\usepackage{lipsum}
\title{A sample file for publishing in IEEE using \LaTeX}
\author{F. Abdullah}

\begin{document}
\maketitle

\begin{abstract}
\lipsum[1]
\end{abstract}

\begin{keywords}
sample, keywords
\end{keywords}

\section{Introduction}
\lipsum
\end{document}
```

## A sample file for publishing in IEEE using $\LaTeX$

F. Abdullah

*Abstract*—Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

*Index Terms*—sample, keywords

### I. INTRODUCTION

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, con-

nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit.

As was shown in Figure 1, the base of LaTeX is coding. Although it is not supposed to be the hindrance but it is the reality here in UNITEN. Coding regardless of languages used is the hardest from the perspective of students. Therefore, this paper will share the experience of College of Engineering, UNITEN introducing and promoting the use of LaTeX among final year students, to capitalize on all the advantages it has and give new knowledge and skill to students.

## 2. PLANNING & IMPLEMENTATION

The planning started in 2008 with a few lecturers forming an interest group. From there, a workshop was conducted to increase the number of members in the interest group. After few discussions, proposal was submitted to the college management to form an official committee under supervision of Deputy Dean of Academic. So, in 2009 the committee called TuG@UNITEN was form officially.

Before promoting the program to students, a workshop for lecturers was conducted targeting those who are pursuing masters and doctoral degree. The workshop focused on using LaTeX to write thesis and journal paper. It is here that the class file for thesis according to university's format was introduced since most participants are pursuing postgraduate internally. The reason for selecting these group of lecturers is that they can capitalize on the new skill for themselves and when they see that it has a lot of benefits, then they will promote it to final year student they supervise.

In College of Engineering, UNITEN, the final year project is spread into two semesters, namely FYP1 and FYP2. Students are needed to submit two progress reports during FYP1 and one progress report and two thesis drafts in FYP2. The workshop for LaTeX is conducted for FYP1 students before progress report 1 is due so that during the workshop, they can use the material for the report as practice. For that, a separate progress report class file was created. For FYP2, they were introduced to thesis class where they used that to straight away write their thesis during the workshop as practice.

Table 1 shows the number of participant for each workshop that was conducted. The seat is limited to between 30 to 40 students for effectiveness of delivery. The workshop was conducted by about five facilitators where one will be presenting the content in front and the others will move around to assist students. This method was adopted since the students were expected to use the program to write their progress report and thesis.

**Table- 1.** Number of workshop participant since 2010

<b>Date</b>	<b>Number of participants</b>
25/2/2010	25
10/12/2010	36
7/10/2011	14
16/12/2011	43
22/6/2012	25
29/6/2012	21
27/7/2012	14
10/8/2012	11
30/11/2012	34

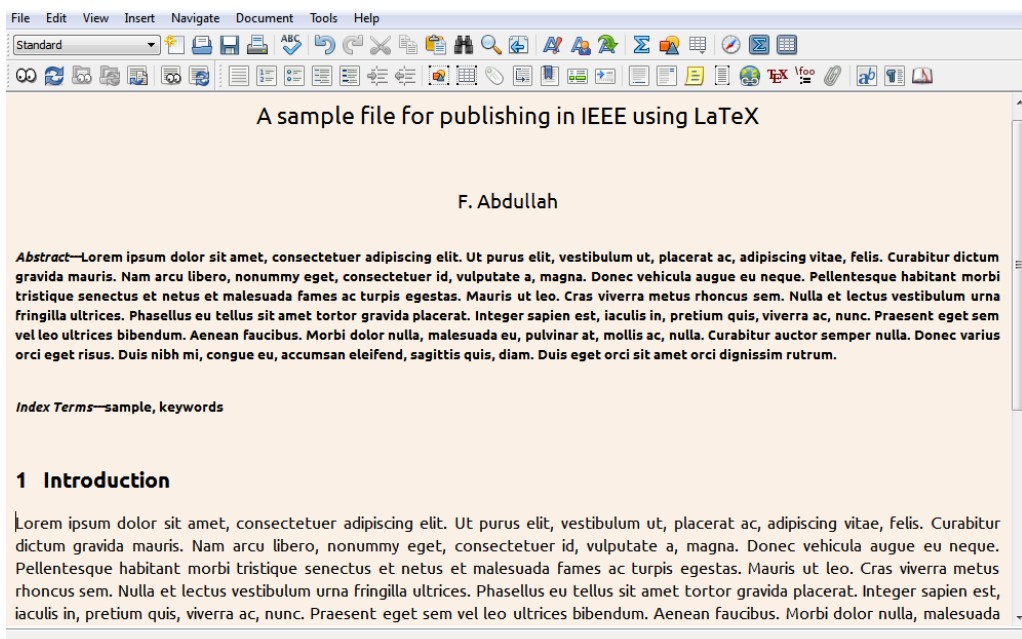
LyX was chosen as LaTeX editor for the workshop since the user interface closely resembles other word processing software. Although using source code to create LaTeX document is more powerful, with LyX it is easier to camouflage the coding complexity. Figure 2 shows the LyX interface and the entry in figure will produce the same output as in Figure 1.

The decision to select LyX as the editor to introduce is mainly because of discussion with members of the committee. They all see that students in college try as much to avoid source code based computer program. Furthermore, they are used to other word processor, in particular Microsoft Word, since first year where they have to write numerous amounts of reports. Other type of editor was also introduced to students but it is up to them to make a choice. Most of them, stick with LyX.

As shown in Table 1, the frequency of workshop has increase from twice a year to five times per year. This is due to the fact that starting from end of 2011, the committee sets up a communication channel for students. It is very important especially post-workshop to have this channel since generation nowadays is more connected than before. They also prefer online form over paper-based one. Therefore, for registration to the workshop, we use online form where the notification of workshop was made using email blast. An email account was set up for students to send any enquiries anything pertaining to LaTeX. The committee members also spend two hours every week for LaTeX clinic where during this time students can come and discuss any problem they faced. So, it is very important to have a proper communication channel with students, especially post-workshop to keep the enthusiasm between them.

It is still a long way to go, but the number of attendees of the workshop keeps on increasing every semester. The committees are planning to expand the coverage where in the future it will include laboratory reports as well.

**Figure- 2.**LyX interface and input entry for the same output as in Figure 1



### 3. FEEDBACK

Students using LaTeX was asked to comment on their experience using it for their final year project report. There are pros and cons in their comment as quoted in Table 2.

**Table- 2.** Some comment from students using LaTeX for their final year project report

Pros	Cons
It simplifies the table of contents and figures as well as references. As we do not have to worry about the sequence and listing of the new figures, chapters or sections added into thesis.	However, there is no spelling error shown when using LaTeX. It's kind of troublesome when we have to do it in Words and transfer back to LaTeX. It might cause some issue with LaTeX where we have to download packages for the fonts or whatever things which cause the document could not be converted to pdf.
The format and fonts are fixed accordingly to UNITEN's requirements, no doubts in using LaTeX.	For downloading packages, it's not user friendly when we're connected to the hostel's internet.

Some issues on cons that are listed were easily solved. LyX does not have spelling error checking as when the entry was made, like in Microsoft Word. It has to be invoked each time we want to by selecting the function from menu selection. The package downloading was a troublesome ordeal since the network setting of UNITEN does not support the format of LaTeX packages updating system. There is continuous discussion with IT unit of UNITEN to rectify the matter, which is also part of the committee's responsibility.

This strengthens the reason why we need a proper communication channel where the student can ask questions, which to them cannot be solved but in reality has simple solution.

### 4. CONCLUSION

This paper shared the experience of introducing LaTeX as tool of choice to prepare FYP report among engineering students in UNITEN. We introduced LaTeX by using LyX to ease the migration from other word processor. Once introduced, the follow-up support is very important where email correspondence and two hours clinic every week did help enthusiastic students. We believe that this added knowledge and skill will be very useful for the student once they graduate.

### REFERENCE

- Almstrum, V. L., Dean, C. N., Goelman, D., Hilburn, T. B. and Smith, J. 2001. Support for teaching formal methods. *ACM SIGCSE Bulletin*, 33(2): 71- 88.
- Fox, M. A. and Hackerman, N. 2002. Evaluating and improving undergraduate teaching in science, technology, engineering, and mathematics. National Academies Press.
- Gray, G. and Costanza, F. 2003. Experiences and lessons learned teaching LATEX to university students. *TUGboat*, 24(1): 124-131.
- Havill, J. T. and Ludwig, L. D. 2007. March. Technically speaking: Fostering the communication skills of computer science and mathematics students. In *ACM SIGCSE Bulletin*, 39(1): 185-189. ACM.

- Loch, B. I. 2005. Tablet technology in first year calculus and linear algebra teaching. In Proceedings of Kingfisher Delta'05: The 5th Southern Hemisphere Symposium on Undergraduate Mathematics and Statistics Teaching and Learning. University of Queensland Press. pp: 231-237
- Scales, J.and Ecke, H. 2002. What programming languages should we teach our undergraduates? The Leading Edge, 21(3): 260-267.