

Improving the student's mother language control in an electronic engineer school:

“An illustration with a robot user manual American to french translation”

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Abstract: This paper first point out some major changes in student's behaviour in our electronic school. One of these important changes is a partial loss of the French language control. The consequences of this phenomenon are indicated. We suggest here an example of a possible pedagogical exercise in order to restore the quality of student's French language control. At least, we give results and comments on this experience.

Key words: Engineer school, student's behaviour, mother language control, pedagogical experience.

1. Introduction

1.1 ENSEIRB short presentation

The “Ecole Nationale Supérieure d'Electronique, Informatique et Radiocommunications de Bordeaux” is one of the graduate national engineering schools, known as 'Grandes Ecoles', in France. It is also one of the oldest, as it was founded in 1920.

ENSEIRB has developed with the growth of information and communication technologies. The Computer Science Department was created in 1986 to complement the original Electronics Department and was followed in 2000 by the new Telecommunications Department.

1.2 ENSEIRB teaching evolution

Since a few years, a Quality Program has then been engaged in our school. And all the scientific, electronic, and other engineering fields of the ENSEIRB program will have to be reformatted.

This evolution has been decided after a long observation process in order to better match to the student's needs and behaviours. Among major changes, we can quote for example:

- introduction of new thematic (technical economical, cultural topics)

- reduction of the obligatory attendance time at the school
- Development of personal and individual student's work.
- Modification of pedagogical strategy (free projects, psychological approach, professional project, motivation process...[1] [2])

2. The student's behaviour evolution

We have attended for a few 10 years, important changes in student's behaviour. The teachers are in front of a new kind of public and do not know how to manage behaviours which are not familiar. Among the major evolutions and new difficulties, we can extract the most important one's:

- After having known a fall in the years 1995, 1997, the quota of foreign students increases again [18]: The international origin (around 25% of the whole students in our electronic department) and the diversity of social origin of our students increase the difficulties of teaching.(problems of comprehension due to a non perfect control of the French language) [12]
- Most of the students have a lot of extra scholar activities such as sport, computers, internet electronic games, and other leisure's. They are interesting from a personal development point of view, but they also

generate a too big mental energy dispersion and a loss in term of written culture.

- Higher passivity during the classical courses: Using modern tools such as “power point slides” to give a lecture and/or distributing printed copies of the course as support at the beginning of the lecture has some perverse effects: Indeed, the students listen and look to the lesson like spectators in a cinema. They do not take anymore written notes during the lesson. There are two main consequences: a loss in written language control and a break in the short term memorisation process inducing a poor knowledge appropriation.

- A reduction of capacity of attention (inherent in human being and normally about 45 min with 1 hour) has also been observed. Thus, the efficiency of a traditional theoretical course of 1 hour is now poor, due to a progressive unhooking of the audience faster than before. All these observations are confirmed by Neuro Linguistic Programming studies [1] among others.

- Disaffection of our scientific book library: the number of students consulting technical reviews has drastically decreased since a few years. Over the spare time of our students, only approximately 5% are devoted to the reading today against 10 % ten years ago. This time decreased with the profit of “Internet surfing”. This loss of interest for reading is related to a general tendency due to the society evolution and multimedia emergence. But this phenomenon increases the difficulties of language control.

- At least, we observe partial but important losses in French language control. Probably due to SMS mobile phone fashion, text processing software and automatic correction, and also to the civil society evolution (visual media support), our students have many problems with spelling, grammatical and syntaxes structures in their mother language.

2.1 Consequences on practical lessons, industrial training period reports, job request...

With this evolution and losses in French language control, we observe some consequences in the student’s work:

- Year after year, the practical lessons reports are poorly written with a lot of mistakes. The necessary comparison between theoretical and practical results is not done. Comments about measurements method and

results are no more given. Scales and units on curves are often missing... A later exploitation of the reports is then very difficult or impossible.

- Reading the “Industrial training period report”, written by the students after training period in private or public companies, we also detect some difficulties in written language and talk techniques control [9]. From time to time, we have bad feed back from the training manager.

From our point of view, it seems to be important for our students (who are future engineers and technical managers), to have a perfect control of mother language such as foreign language.

So, in front of this situation, each one of teachers has to suggest modifications, new ideas in each own field of competence. As an example, we describe here an experience we did to improve the “French language control” of our students.

3. “User manual” translation exercise.

3.1 Introduction

Thanks to a partnership between the French retailer of Parallax inc Californian company (L et Cie 78 Versailles), and ENSEIRB, we get some robots for educational purposes. Among the set of available robots, the funny “boe bot” robot (figure 1) [5] has been chosen to experiment the “user manual” translation strategy.

3.2 Special interest in boe bot “user manual”

The boe bot is a small funny and versatile robot dedicated to USA young pupils and teenager’s education for a first contact and approach to the electronic and computer sciences:

The user manual look like a linear and progressive tutorial with a typical USA approach: 300 pages length, with a global system approach and a lot of concrete examples. The sensors principles are very shortly described.

This guide allows the users to quickly program the robot and to have fun with it. Unfortunately (or fortunately depending of the view point), the USA way of minding is totally different from the French one’s. That is an excellent reason to include a translation exercise in our pedagogical flowchart.

4. Short description of the robot

4.1 General description

This mini robot consists mainly of:

- Four battery cells
- A set of sensors,
- Two motors and wheels
- A Basic stamp processing board
- Mechanical parts
- A gripper system (optional)

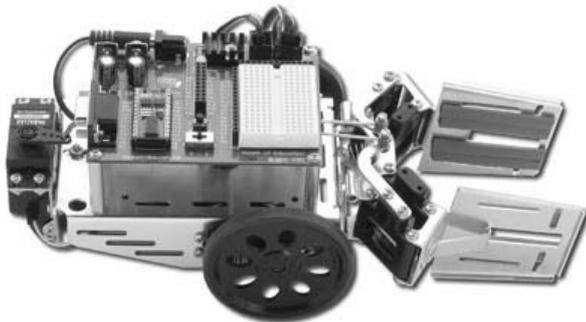


Fig 1 : boe-bot view (picture from parallax inc)

4.2 The set of sensors

Robots are a perfect support to study the “sensor world”. In our small robot, a set of quite simple or sophisticated sensors is available into the robot kit. The most popular are shortly listed below.

4.2.2 IR obstacle sensors

The infrared front detector can be used for obstacle detection as well as border line detection. The receiver is a classical one (used for TV remote control) with a carrier frequency at 38 kHz.

These sensors can operate as a binary detector or can work as distance measurement by sweeping correctly the carrier frequency if knowing the IR characteristics of the target.

4.2.3 Compass modules

A Dinsmore 1490 sensor (Robson company) mounted on a processing board (figure 5) a mechanical compass. A set of four Hall Effect sensors is used to estimate the motion direction.

4.2.4 Other sensors

Other extra or optional sensors such as temperature sensors, CMUCam [14] for target tracking, MEMS inclinometer for motion in rough ground, “whiskers”

for mechanical obstacle detection, can obviously be used depending on the user’s preferences.

4.3 Processing board

Depending on the use of the robot, the students can work with the included basic stamp board or can design their own microcontroller board. In this case, a micro chip PIC 16F873 is often used and a C language management program can be written.

4.4 Actuators

There are two classical servo motors for left and right wheels driving (or crawler kit motion Fig 2). A small modification allows a full 360° rotation.

As the two servo are not coupled, the rotation speed must be calibrated (mechanically and/or by software) to insure a right trajectory when the command signals are identical.

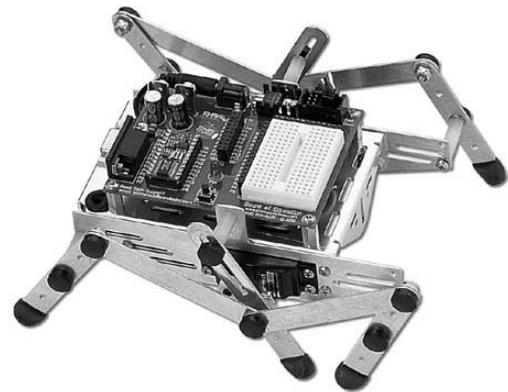


Fig 2: Optional Crawler kit connected to servo motors

An optional servo motor can be used to open and close the gripper.

5. Translation works

5.1 First translation process validation

Before introducing this exercise in the normal pedagogical cycle, we first tested it with some students during a 2 months training period. So the main questions and difficulties have been observed and solved before extending this experience to the whole of the students.

Before starting the translation work itself, we first perform a practical demonstration with a boe bot in action. The students are invited “to play” with it in order to improve their interest and motivation for this work.

Then, the translation process follows some important milestones:

- Reading and understanding the US manual, (at the syntax and vocabulary level and then at the technical level) (discussion on reading methods)
- Assembling the robot and verifying the assembling instructions
- Testing the robot basic's and first programming (this step includes a deep understanding of the programming language, instructions codes analysis, timing analysis, investigations on mechanical and general performance limitations...)
- Sensor theory investigation, practical characterisation, range exploration. Test of sensors by writing some program.
- Actuators characterisation (speed, power consumption...), explanation and description as simple as possible.
- Thematic bibliography: in order to complete the French manual, some technical or cultural information or references have to be included.
- Calibration and characterisation procedures details (velocity, rotation angles...)
- Discussion on "user manual" organization (information sorting) and global structure;
- Discussion on chapter organisation (schematics, pictures, explanation level, progressiveness),
- Discussion on French approach compared to the US approach (with foreign language teachers and human sciences teachers)
- Definition of technical level content's depending of the student's profiles and cultures.
- Formatting the text to the French way of minding
- Pre Writing in French using modern tools such as text editor, table of content automatic generation, index management etc.
- Cover sheet design: (an optional exercise for a commercial approach which requires art and drawing capacities)
- Reading and correction of the manual by one technical teacher and one French linguistic teacher.
- Oral presentation: At the end of training, the students orally expose their translation strategy and work.

5.2 Exercise generalization

After this preliminary test, the translation work has been suggested by group of 4 students in second year study.

For duration reasons and available time, we reduced the exercise to the translation of only few chapters. The student's work organisation is "free"(non framed). There is only a few "regular meeting" with the

teachers. The drafting can be partly made at the School (if need be to have at disposal the robot) and partly at the house.

After the student group constitution and task repartition, each of the students translates a piece of user manual. This approach obliges the students to have a homogeneous, harmonious and coordinated work.

The result is an optimized and assembled "French user manual".

6. Advantages of this translation's exercise

- The funny aspects of the project (the robot is moving and flashing) are a source of interest and motivation for a "not very exiting intrinsic work".
- The translation is not a literary translation but much more: some "freedom" given to the students into the translation gives the impression to them to be actors and technical creators.
- Referring to past publications [6],[7] the four quadrants of the brain Hermann modelling are solicited, so that rational, organisational, intuitive and creative aspects are all swept. (The left brain is more corresponding to scientific, logical, structure, and attitude while the right brain is representing literature, art, oral and writing expressions qualities).
- This work is an opportunity to be « open » on different possible approaches of a same problem depending on the cultural origins: the « system » approach allows connecting different fields of electronic (Analogue, digital, sensors, micro programming, and power motor driving), while a more analytic approach allows a fine and detailed comprehension. Mixing these approaches oblige the students to sort the information, and to structure their translation in order to match as well as possible.
- Among other, the explanation of the sensors and actuators calibration processes, oblige the students to perform thematic bibliography researches into our technical library. It acts like an incitation to read, an invitation to "the pleasure of reading". At least, it is for some of our students to "discover" the library department.
- The translation is an excellent opportunity for sentences building, semantic and syntax verification, orthographic mistakes correction, and chapter building.
- It requires an effort of scientific vulgarisation and explanation using simple words for non specialists. (The commercial target of the retailer being teenagers

and hobbyists which are not inevitably specialists in electronic)

- The translation is at least a time for a human experience and team work. (it develops the coordination spirit and requires an effort to give back an homogeneous work despite the "writing style" diversity.

7. Results

After four years of experiment and some iterations three "fully translated user manuals" («toddler» (a small walking robot, «sumo bot» (a fighting robot) and the «boe bot» a multitask robot)) have been validated by the French retailer.

Since 2005, they are sold with the robots for the French-speaking market: Indeed, it is a good reward and recognition of the work's quality provided by the students.

By this way, the goal of our experience seems to be reached. But, in order to get some feed back about that, we asked to our electronic department to make an opinion poll and report among the students.

Around 60% of the students answered to this questioner and the result shows a global satisfaction rate of 65%.

In this report, the students first point out the funny aspect of the robot, the multi competence aspects, the necessity of a rigorous and well frame worked translation. A few of them founded the translation work "easy". But most of students indicate that they all encounter the same kind of difficulties: general manual organization, "top down" introduction, sentence building, conjugation of verbs, synthesis "spirit". Anyway, they all learned something from this experience. But from our point of view, the remaining negative point is the orthographic mistakes rate, which is always a "little too high".

8. Conclusion

We showed in this paper that the evolution of our society induces losses in French language control for our future electronic engineers..

Taking into account the pedagogical needs, we suggested some adaptation in teaching approach:

In connection with the foreign and French language teacher, we presented a simple exercise in order to improve the mother language control of the students. Through a serious but funny robot user manual translation, we showed that it was possible:

-to make first the students conscious of a good language control necessity,

- to obtain interesting results by a strict and complete frame worked exercise.

Looking at the first encouraging results, it seems to be a good way (among others) to solve the written expression difficulties of the students. Even if we are obviously conscious that the language controls requires a permanent and daily effort from the teachers and students.

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