

Role-playing games for the simulation of a professional experience combining scientific and management learning

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INTRODUCTION

In the context of the education program of the department “Technologies for Energy, Aerospace and Engine” of the school of engineering “Polytech Orléans” (France), a role playing game is organized during the 1st year of master level.

According to the employment statistics of our students at the end of the present education program, it was confirmed that most of them obtain a position in industrial Research and Development departments in big companies as R&D engineers, or in smaller structures as consulting and audit agencies as business engineers. Consequently, a specific program was developed to train students for both types of position and the present paper describes the one dedicated to the position of business engineer.

1 OBJECTIVES

This project takes place at the end of the 1st year of master level and the scientific and technical contents of the project are consistent with knowledge that the students have acquired during this academic year. Beyond the technical realization of the project, a large part of the time is dedicated to management skills.

Indeed, it is expected from this simulation of professional experience combining scientific and management learning that the students can develop some personal qualities that are essential for an engineer, but rarely evaluated, as:

- ability to find and prioritize information, ability to analyze and synthesize,
- autonomy and organization,

- active listening, using arguments, assertiveness, persuasiveness and self-confidence.
- planning

The evaluation of the project is based on the scientific technical outcomes, the quality of the service realization and the personal qualities abovementioned. The general idea of this project is explained in *Fig 1*.

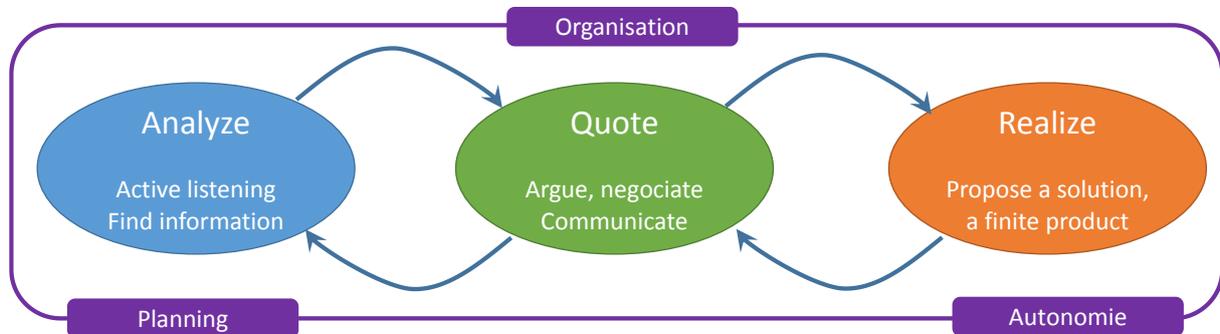


Fig. 1. General principle of the role-playing game in two phases and three interviews with the clients

2 PROGRAM OF THE ROLE-PLAYING GAME

During one full-time month of education, the students are immersed in a role-playing game as engineers in a consulting company, that have to perform all the processes related to a technical service provision dealing with the employment sectors of the department (aerodynamic expertise, wind tunnel testing, internal combustion test bench, air conditioning design, etc.).

The teaching staff composed of engineering science and management specialists, accompanied by industrial partners, build three calls for tenders and play the clients (a company) during the whole project duration. A pair of students, who plays the suppliers, must respond to one of these bids. The present paper is illustrated with a project dealing with the realisation of wind tunnel testing in order to characterise the aerodynamic loads due to the wind on a very large building (see example of bid call on *Fig. 2*). It is intended that the clients do not know exactly what they are expecting from this service provision. This incites the players to ask relevant questions in order to manage to clarify the client needs.

Table 1. Example of quotation grid used to select the best proposal

Price of the proposal	5%
Quality/price ratio	25%
Environmental considerations	0%
Technical relevance of the proposal	30%
Project coherence according to the existing context	10%
Quality of the technical support	5%
Delivery time	25%
Total	100%

Table 2. Example of evaluation grid to give a grade to the student teams (interview 2)

		scale	weight
Presentation	Language	0- Poor 2- Correct 3- Rich 5- Professional	1
	Tone	0- Agressive/Inaudible 1- Monotonic 2- Correct 3- Clear 5- Pleasent/calm	1
	Behaviour	0- Shy 1- Emotional 2- Correct 3- Appropriate 5- Convincing	1
	Time management	0 ±5min 1 ± 3 min 3 ±2 min 5- Within the given time	1
	Professional complementarity of the team	0 --> 5	1
Price	Absolute price	0 --> 5	variable
	Quality price ratio	0 --> 5	variable
	Sectional proposal	0 --> 5	variable
	Price coherence and argumentation	0 --> 5	variable
	Writing quality of the proposal	0 --> 5	variable
Technical relevance of the proposal	Technical relevance and credibility	0 --> 5	variable
	Answers to main needs	0 --> 5	variable
	Answers to secondary needs	0 --> 5	variable
Project coherence according to the existing context	Coherent means	0 --> 5	variable
	Realistic and appropriate delivery time	0 --> 5	variable
Quality of the technical support		0 --> 5	variable
Global consistence of the project		0 --> 5	2
Total			
Selected proposal		Bonus 25 points	1



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A Messieurs Dupont et Dupond

Objet : Consultation pour la réalisation d'une étude aérodynamique

Messieurs Dupont et Dupond,

Par la présente, j'initie la période de consultation pour la réalisation d'une étude aérodynamique dans le cadre du projet de construction immobilière sur le site de la gare TGV Lorraine. Cette étude permettra au bureau d'études structures BATISERF de dimensionner les éléments structurels du bâtiment.

En complément du cadre de prix global et forfaitaire complété, joint au **cahier des charges rédigé par vos soins**, vous voudrez bien nous communiquer le **délaï optimisé réaliste** que vous pouvez nous proposer pour l'exécution complète de cette étude ; sachant qu'elle devra être finalisée impérativement avant le 30 juin 2014.

Nous vous remercions de bien vouloir nous présenter **votre meilleure proposition** lors d'un entretien le 9 avril 2014.

Dans cette attente, veuillez agréer, Messieurs Dupont et Dupond, l'expression de mes salutations distinguées.

La responsable de projets

Sandrine Aubrun

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Fig. 2. Example of a consultation letter

2.1 Identification of the client needs

The first step of the project is dedicated to interviews of the clients by the student teams in order to better identify the client expectations (technical specifications). The first interview is 30min long. During this period, teachers and students play their role of clients and suppliers, respectively. After this phase of dialogue, a debriefing is performed in order to give advices to the students in order to improve their communication performance and also to provide any non-asked, but crucial, information for the next steps of the project. Based on this, the student teams build technical and financial proposals to answer the bid. After a second interview where the student teams present their proposals to the clients, the clients select the best proposal with the help of a quotation grid (*Table 1*) and the effective realization of the service provision is based on this selected proposal. The grade obtained for this project part is based on criteria that are given to the students in advance (*Table 2*).

In order to achieve this first stage of the project (two weeks), some practical lectures are given to the students on the methodology to respond to a bid, to write technical specifications, to assess a financial proposal and to negotiate a contract, right at the moment when they need it to carry out the project.

2.2 Technical realisation

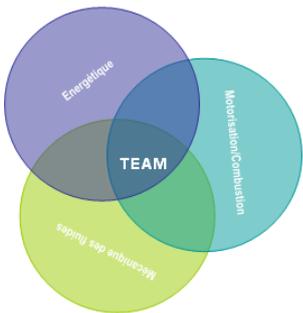
The second part of the project (two weeks) is dedicated to the effective completion of the provision of service. To do so, student teams make use of the technical and scientific skills that they have acquired during their previous education program. If some technical and scientific contents are out of their academic program, they can have access to experts for a maximal cumulative time period of 1h. For that, they have some cheques (*Fig. 3*). These time credits can be used individually or collectively if student teams accept to share these expertise slots.

Expert cheque 10 minutes

Project 4A TEAM

Name of the expert

Signature of the expert





Names of the team:

Signatures:

Fig. 3. Example of expert cheque that could be used in the project

The project period ends on a third interview with the clients, where student teams have to present their results and prove that they have fulfilled the requirements of the negotiated provision of service. They also must provide an extensive report to deliver to the clients about the results they obtained and their interpretation. The database might be provided if required in the proposal.

A last debriefing is performed at the end of this third interview in order to explain each student team the strengths and weaknesses of their performance and correct the technical contents of their work. A template of report is provided in order to give them the opportunity to improve their service.

3 CONCLUSION

The present paper presented an example of role-playing games that are organized at Polytech Orléans for three years.

Combining scientific and management skills during a 1-month project gives the opportunity to the students to practice a position of business engineer in a non-risky framework, determined by the teaching staff of the school of engineering.

The feedback from the teachers, students and industrial partners are unanimously positive, even if the students admit that they are destabilized the first days by the originality of the approach. It generates a positive emulation between students, driving them to unexpected initiatives as the creation of a fake professional website to promote their activities (Fig. 4).

From this experience, it is expected that the students are better equipped to join consulting and audit agencies and will be rapidly efficient business engineers.



Fig. 4. Example of website created by students in order to promote their fake consulting company

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