

# English for optics: A challenge or an impossible dream?

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*This article deals with my experience teaching English to students of Optical Sciences at Alicante University. The theoretical introduction on ESP and EST is brief, and the focus is on the creation of original teaching material, since there are no ELT textbooks which cover the contents included in Optical Sciences studied at the university level.*

## **1. Introduction**

I would like to begin by saying that I am very subjectively bound up with this article, which is inevitable, since I have been teaching a very specific subject for four consecutive years in the same University School.

As we will see afterwards, teaching English for Optics has not always been easy. For example, the large number of students enrolled in courses is a problem that needs urgent solving. But I have enjoyed some good moments, too, specially when I put a “passing” mark on the final exams of former French students who have come to my office telling me it is impossible for them to be on the same level with the rest of their classmates who have experience studying English.

As for the contents of this article, I would like to advise the reader about what I am NOT going to talk about. First of all, I will not be talking about methodology from a theoretical perspective. In these few pages I intend to give a general overview of teaching English for Optics nowadays. I will try to be practical and student-oriented, and I hope this text may be of some help to new teachers in a similar situation. On the other hand, you will see that I am not presenting too many quotes from bibliographic sources (the ones which I have read for this article appear in the bibliographic section) so that reading can be more fluid.

What am I going to talk about, then? As I mentioned earlier, I am presenting a real situation and some ideas about the best way to handle it. I will also try to show that teaching English for Optics can be interesting and enjoyable for students and even for a teacher who has no idea about Optics, lenses, or any other optical or ophthalmological device. This was true in my case, but after four years I am beginning to understand some basic things about this subject. (Which also allows me to be a more demanding customer in an Optician's shop!).

So, the general outline of this article will be:

1. General Situation.
2. Some basic theoretical points.
3. My experience.
4. New ideas for teaching English for Optical Sciences.
5. Conclusion.
6. Bibliography.

## **2. General situation**

The School of Optics at Alicante University was created in 1985 and, since the very beginning, English has been a compulsory subject. Over the last four years, I have been in charge of the two subjects called ENGLISH I and ENGLISH II, given in the first and second courses respectively. It was necessary to mark the difference between the two levels, and so an attempt was made to offer an elementary-intermediate course in first year and another intermediate-semi-advanced in the second year.

Inevitably, I have to talk about problems now. As we all know, teaching a foreign language can be a very good experience under certain conditions. But the real situation at the University of Alicante was:

- 30% of the first-year students studied French as a second language in BUP or FP.
- Total number of class hours: 1 per week.
- Total number of English students on average each year: 450 (approximately 250 for English I, and 200 for English II).
- Low level of motivation.
- Student preoccupation with other subjects.
- Full timetable for all students.
- No habit of asking doubts during tutorial hours.

In short, the average number of students per class was 100, which means teaching a language on a mass-scale basis. As for the number of hours per week, at the end of the year students have really had a 23-hour English course. This is typical of a specialized intensive course for adults who want to refresh concepts or to acquire a special ability, such as “Conversational practice”, “Learning to write an abstract in English” or “Practicing politeness formulas”, for example. Furthermore, it is not easy to follow textbooks in this case, because most of them are planned for at least a 50-hour course.

Nevertheless, students have another opportunity of getting better results with English if this subject is included in the “Conferencias Fin de Carrera”, which are organized for students about to finish their University studies. These lectures deal with subjects such as “Lens fitting”, “History of glasses”, etc, that is, topics which could not be included in their already very full curriculum. For this reason, last year The English Department was offered the possibility of giving

about twenty lectures to third year students.

This has proved a nice experience. Students were pleased because no essay was necessary to pass this special course, only their active participation was required. The very fact of participating in class was difficult in our full classes, but in these lectures I only had from ten to twenty students per class. This is because they could choose between all of the lectures offered, so that some of them preferred to forget about English, but others felt the need to keep in contact with the language. Some of the English lectures were: “Introduction to England, the English and English culture”, “How to achieve better pronunciation” or “Telephoning in English” (in this case we invited them to see a video prepared for this activity).

### **3. Some basic theoretical points on ESP and EST**

#### *3.1. Some comments on ESP*

When reading theoretical books about ESP (English for Specific Purposes), we find two general ideas about it. First, textbooks are usually written with the adult (not the student) in mind. Secondly, there is an important difference in students’ proficiency in English: some of them haven’t even mastered General English.

In the book *English for Specific Purposes*, by C. Kennedy and R. Bolitho, the authors say that functional theories are appropriate for an ESP course, but only if the students have the aforementioned General English background.

ESP usually includes English for Business and Commerce —which is the richest branch of ESP as far as textbooks and bibliography is

concerned<sup>1</sup>— English for Doctors and Nurses (or English for Medicine), and English for Science and Technology<sup>2</sup>. However, many other very specialized branches have appeared recently, as one can see in any database which lists ELT textbooks in print<sup>3</sup>.

### 3.2. Some comments on EST

In a second-language situation, the teacher cannot assume that students come equipped with linguistic skills. He/she must teach these in addition to the scientific content of the course. This places constraints on the organization of the course and on the materials that can be used successfully.

J. Clearly (1975) thinks that we need a SET of integrated materials. For example, high-level science materials, such as lectures and lesson notes should be modified to fit the students' level.

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1. Apart from numerous textbooks dealing with English for Economics, Business and Commerce, some of the most recent texts which fall into this branch of ESP are really specific. Some of them are: *English for International Banking and Finance* (Cambridge University Press, 1990); *Import Export* (Longman, 1982); *Presenting Fact and Figures* (Longman, 1988); *Office Practice* (Longman, 1982); *Accounting*, etc.

2. In our bibliographic section we present all the textbooks used in our classes, taking only the parts we deemed most interesting for Optics. Nevertheless, it is important to take into account that in the branch we have termed EST there is an enormous variety of textbooks, too. Some of the most recent titles show that very specific subjects can be found in EST: *Earth Sciences* (Prentice Hall EST, 1988); *Nucleus: Mathematics* (Longman, 1980); *General Engineering* (Prentice Hall, 1988) *English for Students of Physics* (Prentice Hall, 1992); *English for Students of Chemistry* (Prentice Hall, 1992) and many more.

3. Special mention must be made of the books for the study of English in relation to computers, telecommunication and information systems. Advance in these fields in the last ten years has been accompanied by a great variety of textbooks. There is another important field in ELT textbooks nowadays: English for vocational training studies. We can find titles such as *English for Driving* (National Extension College, 1986); *Car Care: Reading and Writing Skills in English for Speakers of Other Language* (National Extension College, 1992); *Hairdressing: Flexible Worksheets for Vocational ESOL* (National Extension College, 1992). But one can find even more specific textbooks such as *Applying for a Job in English* (Penguin Books, 1990); *World News* (Oxford University Press, 1993); *Sky Talk: English for Air Communication* (Stanley Thornes, 1984), etc., etc.

In spite of our previous remarks about General English, EST is not simply this type of English plus specialized vocabulary. Scientific English uses the same structures as any other kind of English but with a different distribution. There may be a tendency for more passives and more complex nominal groups to occur, while there are few occurrences of question-tag forms. In relation to form and function, there is no one-to-one correspondence between form and function or form and notion. For example, an “If-clause” may be indicative of hypothesis, warning...

The other important point is connectors or linking devices such as *furthermore*, *for instance*, *however*, etc. and, of course, vocabulary: organization of specialized word categories such as technical abbreviations, symbols and formulae, highly technical vocabulary and subtechnical vocabulary<sup>4</sup>.

### 3.3. *English for Opticians: EST, EAP, or simply EOP?*

Kennedy (1984:6) proposes the following division for ESP:

- English for Occupational Purposes (EOP): English as part of a job or profession.
- English for Academic Purposes (EAP): English for University studies.
- English for Science and Technology (EST): important branch of ESP, but too general to prepare teaching material.

I think that at this point we should begin by clarifying which acronym suits “English for Optics” best. Is it ESP, in the more general sense?; is it EST? Working now from a different perspective,

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4. In 1975 The English Teaching Information Centre published a Specialized Bibliography on “English for Science and Technology”. It would be very interesting to have an up-to-date revision of it.

is it EAP, or is it simply EOP? This last case is of course related to vocational training and not to university studies, but sometimes labels must be applied without fear of betraying definitions.

As far as general skills is concerned, the aforementioned factors of number of students and lack of hours demanded a radical decision: we couldn't tackle the four skills, and so we decided to centre our efforts mainly on reading comprehension. The reason for this is that Optics students at Alicante University receive a few articles written in English which they should translate and study as important texts for subjects such as Optometry, Contactology or Geometrical Optics.

Just before finishing their studies, students are always given four or five articles in English from a Scientific Journal as part of the basic bibliography to write their final essay. All this research work, specially that related to this final period of Optical Sciences may fall into the EAP category. So, only this group maintains the need for EAP-oriented English. Only a few students will work in a scientific laboratory, and just the best ones will stay at university, teaching or assisting teachers in some way.

However, for the rest of the students, their future job will be to work in an Optician's shop. Some of them will give customers advice about glasses; others will fit contact lenses and will measure visual defects with special optical equipment. In this case, we are dealing with EOP. The fact that occupations such as hairdressing or car repair falls into vocational training schools makes us think about Optics as a customer-centered job, and in this case it is similar to the former ones. On the other hand, we are not comparing them on the contents level, of course, for we know that Optics is studied at university and all subjects are extremely difficult and rich in content.

This is why we have adopted a mixed approach which could be stated as a simple formula: ENGLISH FOR OPTICAL SCIENCES = EAP+EOP. The reader may have noticed that I have chosen the sentence ENGLISH FOR OPTICS and not ENGLISH FOR OPTICIANS. We use the latter expression when we want to refer to the owners or assistants working in an Optician's shop who want to learn or review their English for other reasons.

In other words, our approach has been a teleological one, with an interdisciplinary approach which makes use of every text or material which may suit our students.

## **4. My experience**

### *4.1. Motivation and the first classes*

The reasons for considering the English language to be a truly international language are varied but, in the case of our students, the main reason is ACCESS TO SCIENTIFIC AND TECHNICAL LITERATURE. That is why we always use texts related to subjects studied in our "Escuela de Optica": Mathematics, Physics, Chemistry, Geometrical Optics, Practical Optics, Contactology...

The very first day we try "not to teach anything", talking about this important reason to learn English, and introducing some general points such as basic bibliography. For example, several technical and general dictionaries are named and discussed and, if possible, I try to show them to the students. The following class will be used to test their General English level with a brief questionnaire, specially in the case of first-year students.

In the case of the conferences organized for third-year students,

motivation is an easy task. As we had no pressure to finish the syllabus, the first lecture was “General things about England”, which students found interesting. This was a positive beginning before starting with grammar, vocabulary or more abstract subjects. We would like to mention here that we used the book *How to Be an Alien*, by George Mikes, in which you can find really funny remarks such as:

- In England everything is the other way round.
- In England, if you don’t repeat the phrase “Lovely day, isn’t it?” at least two hundred times a day, you are considered a little bit dull.
- On the Continent people have good food, in England people have good table manners.

#### 4.2. “ENGLISH I” and “ENGLISH II”: syllabus and final remarks on methodology

After four years of teaching English for Optical Sciences, we have come to the conclusion that, as far as methodology is concerned, eclecticism is useful in ESP. In fact, some structures are happily explained following the structural method, whereas others are best explained with the functional approach.

As for coursebooks, there is not one with the would-be optician in mind, and so one has to choose among the scientific/technical titles in general. This is why we created our syllabus and chose our own teaching materials.

##### 4.2.1. *English I:*

A) Grammatical concepts were taught by way of two different texts: a brief summary of English grammar made for the low-level student, and the daily grammatical explanations which we adapted to

optical subjects when possible. In fact, all examples given were related to their specialized vocabulary. For example, in order to explain consequence, we used sentences such as:

**a)**

1- Your eyes are a precious gift,

(AND) SO

(AND) THEREFORE

WHICH IS WHY

AND THAT IS WHY

WHICH MEANS THAT

you should treat them with care.

**b)**

1- He was SO slow THAT the customer left the shop.

He worked SO slowly THAT ...

2- He has to study SO MANY subjects THAT he cannot study very well.

3- There was SO MUCH dirt THAT we didn't know what to do.

4- They are SUCH good friends THAT they always study together.

The general objective of English I is to develop elementary reading comprehension skills. It is known that the most significant handbooks on Optics are written in English and there is a general lack of translations into Spanish. Hence, the importance of mastering reading comprehension for our students.

Our syllabus for this course is the following one:

- a) Technical vocabulary. The noun phrase.
- b) Reference. Usual devices.
- c) Scientific discourse markers.
- d) Major functions of scientific discourse:
  - static description
  - dynamic description
  - instruction
- e) Minor functions of scientific discourse: classifying, comparing, deducing, drawing conclusions, defining, exemplifying, hypothesizing, recommending, sequencing, ordering, warning, describing location, measurements and movement, cause/effect, condition, degree, difference, function, obligation, possibility, preference, purpose, reason, result, similarity, suitability.

#### 4.2.2. *English II:*

The objective of this course is to work on intermediate reading comprehension Skills. Our primary goal is the analysis of scientific texts, especially those related to the study of Optics: Geometrical Optics, Practical Optics, Contactology, etc.

Our teaching methodology is similar to the one used in English I, although the main difference is that we don't put so much emphasis on grammar, but try to work on texts even more. These texts are abridged and genuine materials. However, some grammatical points are explained following the book by John Eastwood *Oxford Practice Grammar* (1992).

The syllabus is divided into:

- a) Lexical problems in English for Science and Technology: sub-technical vocabulary, noun compounds.

- b) Discourse functions: description, definition, classification, instruction, visual-verbal relationships.
- c) Grammatical relationships: passive-active distinctions, use of modals, problems with the definite article, reference to previous research.
- d) Discourse strategies: time reference, space reference, causality and result, order of importance, comparison and contrast, analogy, exemplification, illustration.

### 4.3. *Integrating methodology*

#### a) Guidelines for the study of Scientific/Technical English.

In relation to teaching material, several books on ESP and EST were consulted before creating this syllabus, although we finally decided to rely on *English for Science and Technology. A Discourse Approach*, by L. Trimble (1989). We may say then, that some of the lessons for second-year students follow the theoretical guidelines given by Trimble in his book. Its contents and ideas are based on the current theories about cohesion and discourse. So, according to Trimble, the main guidelines for the study of scientific English are:

1. The paragraph (considered as a conceptual unit):
2. Cohesive devices, discourse markers:
  - time
  - space
  - cause and effect
  - order of importance
  - comparison and contrast
  - analogy
  - exemplification
  - illustration

### 3. Main discourse functions:

- description
- definition
- classification
- instructions
- visual-verbal relationships

### 4. Discourse-grammatical relationships:

- passive-active distinctions
- problems with the definite article

### 5. Lexis:

- highly technical vocabulary (it should be studied in context and it is not difficult for students who are familiar with the terminology in Spanish)
- sub-technical vocabulary or semi-technical words
- noun-compounds (very common in scientific texts)

We have been making use of these guidelines when appropriate for our purposes. For example, for first-year students of English we made a list of approximately six pages with this kind of vocabulary, extracted from different sources, subdivided in: a) noun or noun phrases), b) adjectives and c) verbs, and with a Spanish translation (if necessary, more than one meaning is given). Some examples from this list are:

#### NOUN OR NOUN PHRASES

coating - *baño, capa, revestimiento*

frame - *montura de gafas, armazón, estructura*

goggles - *gafas de protección*

#### ADJECTIVES

rubber - *goma, caucho*

VERBS

to clamp - *grapar, sujetar fuertemente*

to wear - *llevar (objeto, ropa), gastarse*

*b) Basic conversation practice.*

We created a summary with the most usual conversational sentences, including headings such as GREETINGS, POLITENESS PHRASES, LIKES, DISLIKES, which were nice and short to start conversation practice. All these sentences should serve as a basis for the creation of a “typical conversation in the Optician’s shop”. We created two more texts to aid students in this task. One of them was an imagined conversation which everyone could have a look at, and the other contained a list of specialized vocabulary dealing with: contact lenses, glasses, frames, visual care, colours and selling. We also provided students with a selection of false-friends for the would-be optician.

*c) Texts: adapted, abridged and genuine.*

ADAPTED TEXTS:

For some exams I have designed some short texts which include grammar studied in class and vocabulary pertaining to their yearly list. So, these texts resemble real ones, and here are some excerpts:

text 1:

“HOYA contrast lenses give you better vision in adverse conditions. They do not only filter out bright sunlight, but also result in good colour...”

\* Points to study:

- syntax: not only ...but also

- vocabulary: to filter out, sunlight...

text 2:

“TOPCON is associated with optical technological development. Therefore, it combines superior optical quality with innovative mechanical design. To design the VT-SE, several features have been incorporated which facilitate...”

\* Points to study:

- connectors: therefore,
- grammar: passive, etc.

ABRIDGED TEXTS:

We have used a selection of adapted texts, found in some scientific textbooks, or in some special ELT magazines such as CURRENT, for example. Here we have some sentences and paragraphs:

1. Light travels very fast. It moves at 186,300 miles a second...  
(from *Elementary Scientific English Practice*, by Thornley)
2. Hard contact lenses. The original contact lenses were made of glass. However, most hard contact lenses have been made of poly (methyl methacrylate)...  
(from *Encyclopedia of Polymer Science and Technology*)

GENUINE TEXTS (excerpts):

Text 1:

The retina of the eye contains hundreds of CONES and RODS, whose function is to receive light pulses and change them into electric currents.

(from *Geometrical Optics*, by F. Jenkins)

## Text 2:

The human eye is the organ by means of which we obtain most of the knowledge we are concerned with in optical matters, and therefore a description of its construction is desirable. It will not be dealt with here from a physiological aspect, but more from the standpoint of an optical instrument.

(from: *Optics and Optical Instruments*, by Johnson K.)

We are confronted here with a very useful text for our students. It has three characteristics which make it so useful:

- 1- Subject of interest to the student.
- 2- Type of information presented: description, one of the major functions of scientific discourse.
- 3- Grammatical level: upper-intermediate.

## Text 3:

The term OPTICS is derived from a Greek root meaning “pertaining to the eyes or sight”. It denotes a science, divided into many branches...

(from: *Ophthalmic Prescription Work*, by Bennett, A.G.)

### 4.4. *New materials*

We have been using English leaflets from Optician Centers and Optician’s shops which deal with commercial products (cleaning fluids, frames for glasses, different contact lenses). I have been asking for this material in different trips to England, but of course one can write to the commercial company and ask for it, too.

However, the most difficult materials to find are those that describe OPTICAL EQUIPMENT AND INSTRUMENTS. On the one hand, this material is not distributed as easily as the more commercial type. On the other hand, these leaflets really suit the student of Optics, for he/she will have to use these instruments and machines as part of their daily routine when they start working. Besides, leaflets on glasses or contact lenses have a Spanish translation (Essilor, Hoya, Nikon, Christian Dior, etc are willing to prepare them for Spanish Optician Centers) but leaflets on optical equipment are not translated on a regular basis.

Here we have some interesting examples taken from different leaflets which relate to optical instruments which any optician should know:

#### SPECIFIC INSTRUMENTS

- VT-100 vision tester
- ultramatic RX master refracting instrument
- TOPCON lensmeter

#### DESCRIPTIVE SENTENCES FOUND IN THESE LEAFLETS

- superior lens coating
- exceptional testing range and accuracy
- unsurpassed optical and mechanical quality
- freely adjustable instrument tilt
- applanation tonometer for glaucoma diagnosis

#### LEAFLETS FROM OPTICIAN'S SHOPS

- Anti-reflexion, super-hard, multi-layer lens
- hard-coated, scratch resistant lens

- spare pair of lenses
- optical practitioner
- frequency cost contact lenses
- monthly and three monthly care packs
- professional eye test

#### OPTICAL INSTRUMENTS USED IN THE OPTICIAN'S WORKSHOP

(These examples are taken from the dictionary, but notice that most of us don't know their meaning in Spanish!)

- centering suction holder: soporte de la ventosa de centrado
- eyepiece focusing knob: el botón de ajuste del ocular
- main drive unit of the polar axis: mando principal del eje horario

### **5. New ideas for teaching English for Optical Sciences**

I thought that it was vital to include this section in this article for several reasons: the need to be up-to-date in teaching trends, which entails including what new technologies offer us, and the need to find texts and teaching aids for English for Optical Sciences. In general, new technologies usually include the use of computers, but now there is another instrument with even more didactic approaches: CD-ROM. This Compact Disc-Read Only Memory has different applications, and nowadays multimedia CDs are just perfect as aids to learning a second language.

The other important point when talking about new contents in syllabuses is making reference to library instruction and documentation techniques. Huckin (1987) and Trimble (1985), for example, think that some classes devoted to these subjects are good, since EAP groups at any level are certain to need reference or library skills. We tried to follow these ideas and made several charts like the

following ones:

#### WHAT SCIENTISTS WRITE

- Laboratory or field notes
- Data sheets
- Notes from lectures
- Ideas
- Letters
- Essays, articles, books
- Instructions
- Technical reports
- Theses or dissertations
- Book reviews

#### FACTS ABOUT READING

- Overabundance of information.
- Important encyclopaedias: E. Britannica, Chambers E. of Science and Technology (McGraw-Hill), with articles that can be understood by non-specialists.
- Handbooks: concise reference books for day-to-day use by specialists.
- Style manuals and guides: Royal Society of London: General Notes on the Preparation of Scientific Papers for Publication.

After explaining the meaning of this chart in more detail, one possible activity is choosing some notes taken in previous classes (Chemistry, Contactology, etc) and trying to translate them into English).

## 6. Conclusion

I would like now to present the main conclusions of this article, which can be summarized as follows:

1. There is an important lack of teaching materials in the specific field of *English for Optical Sciences*.
2. Eclecticism is the best methodological solution in this particular case.
3. I follow a teleological approach, having students in mind. That is why employment prospects are seriously taken into account.
4. My teaching strategies involve both EAP and EOP.
5. I think that teaching English for Science and Technology can be attractive and funny even if you don't have a scientific background.

Furthermore, teaching English for future opticians is very recent in Spanish universities: up to 1992, only six universities offered Optical Sciences: Murcia, Santiago de Compostela, Granada, Tarrasa, Madrid (Universidad Complutense) and Alicante. Valencia will be added to this list in the new academic year.

However, talking about the future in this precise moment is difficult, because with the new curriculum designs about to be approved, it is not clear whether English (as an academic subject) will be optional for students or will not be included in these new designs.

So, coming back to our original point, teaching English for future opticians in Spain is very recent but, on the other hand, we don't

know if this subject will fall into the EAP group anymore. Whatever the solution, the close cooperation of Science and Language specialists is needed to produce teaching materials that can be successfully used in many scientific areas.

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