

THE ROLE OF THE STUDENT IN SELF-DIRECTED LEARNING. PRIORITIZATION OF THE RESOURCES IN PRACTICAL TRAINING AND THE USE OF AUDIOVISUAL NOTEBOOK

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Abstract

Practical training in Histology requires additional training that promotes meaningful learning of relevant structures and pathognomonic of tissue structure. Based on this statement, two studies have been carried out and are comprised in this work. The first study investigates the prioritization of different learning paths and learning resources available by the student in order to achieve this objective. Based on these results, a second study evaluates the priorities of the students to configure the communication and transmission model of the contents of the preferred paths.

The first study involves the statistical analysis of the questionnaire's responses provided by one hundred forty-five freshmen medical students in the University of Granada, the result obtained was that students give priority to routes of self-directed learning related to their previous experience -the department's Web and lab notebook- and authority documental sources -books and atlas- on learning paths. These preferences appeared as opposite to the interaction with their professors, suggesting a review of the role of the academic staff in the context of the activity performed and the mentoring model in the Spanish university education system.

The main findings of this study point the usefulness of the audiovisual notebook as a teaching resource. It appears as an instrument that conjoined helpful features of previous experience of the student and documentary authority for self-directed learning in the participatory context required by the European credit under the convergence program.

The second study was carried out with a sample of one hundred and fifteen medical students from to the group in the previous study. Another questionnaire was handed asking about the type of communication in an audiovisual notebook about the execution of a histological technique. This audiovisual notebook comprises all the four preferred routes of learning previously mentioned.

The results obtained from the statistical analysis were that students give priority to the content transmission by verbal communication or text, on any additive adjacent to the core of the message. They also showed a preference for experiential transmission, voice and ambient sound on the textual transmission or the one performed with replacement musical sound.

Thus, the implications of these studies for the histology department are based on the current use of the routes of learning and teaching resources prioritized by the students along with their preferred media characteristics in order to achieve an efficient academic communication and transmission of knowledge.

Keywords: self-directed learning, practical training, prioritization, audiovisual notebook, Histology.

1 INTRODUCTION

Practical training in Histology concerns the acquisition of observational skills, identification and description of the microscopic structures of the body. The fundamental teaching strategy takes place at regular periodic meetings throughout the academic year and consists of organizing the microscopic observation of the tissues that make up the human body. Microscopic observation practices entrench a further understanding of facts read in textbooks, heard in the lectures and discussed at seminars [1] [2]. In practical lectures, students have the unique opportunity to work on their own and understand that the results they get will critically depend on their own ability and interest [2].

Practical lectures in the area of histology present a set of drawbacks. The main inconvenience involves working collectively, all students carrying out the same activity in the same place, at the same time and with the same pace. Some other shortcomings related to this kind of activity are the type of lecturers who are generally responsible of this activity, the absence of appropriate strategies and the lack of formative assessment, with the consequent absence of feedback [2] [3] [4]. There have been numerous attempts to improve the learning strategies of histological images and have achieved significant results [1] [2] [4] [5] [6] [7].

Nonetheless, students need to strengthen the competencies attained receiving an additional training that promotes meaningful learning of the relevant structures and pathognomonic of tissue structure. Then, the knowledge attained must be integrated into the student's cognitive structure [8]. In order to develop this further training and thus encourage the teaching-learning process, a set of methods and teaching resources have been studied. Those facilitate the observation and histological interpretation apart from the direct microscopic observation.

The significant change experienced by the teaching-learning process as a result of the introduction of the new European Credit System within the European Convergence Process must be also taken into account [8]. This change involves an important role playing by self-study plays in the teaching-learning process, which is associated to the three factors that nowadays determine the development of any educational process [9]: the students' increasing need for acting as the main characters in their own learning process, the necessity of integrating an increasingly dispersed and diverse knowledge, and the need, as pointed out by Ortega [10], to practice the economics of education, which means the need to learn only what can be learned.

The self-learning process is developed in the educational levels of secondary and primary schools. This is carried out in relation to different subjects or as an instrument to be used associated to a group of resources such as school libraries [11], innovation in the implementation of self-learning techniques. However, in most cases it has been poorly promoted and driven without any teaching models in order to develop specific guidelines in this area [12].

The use of audiovisual resources in the teaching process is increasing, developing as one of the most basic mechanisms of school-society connection in the context of the mass media culture [13]. However, the regular use of these resources introduces a component of contemplative passivity in the educational process. It hinders the development of student initiative, without encouraging the active attitude of the self-learning process, especially regarding to meaningful learning [14] [15] [16]. Moreover, the importance of the communication model has to be taken into account, which involves the use of audiovisual teaching and its impact on the teaching-learning process [17].

The contents of the audiovisual resources available in the educational process are often used as instruments of the time-space configuration. This communication pattern usually responds to a teaching material prepared by the teacher according to his priorities in the context of the program and learning objectives applicable to the process and the educational level required [13]. The utilization of audiovisual resources ignores the priorities of the students regarding communicative expression, affecting the teaching-learning process that is carried out through these resources.

In previous work, we analyzed the role of the audiovisual book as a useful tool for self-learning if the student contributes to its development through creative participation [18] [19]. In the context of higher education teaching, the active participation of students in the development of audiovisual resources is an excellent model for the development of the European credit system within the European Higher Education Area.

Based on these statements, two studies have been carried out and are comprised in this work. The first study investigates the prioritization of different learning paths and learning resources available by the student in order to achieve an additional training that promotes meaningful learning of relevant structures and pathognomonic of tissue structure in practical training in Histology. Based on these results, a second study evaluates the priorities of the students to configure the communication and transmission model of the contents of the preferred paths.

2 METHODOLOGY

Firstly, the sample for this study consisted of one hundred and forty five students in their first year of the Medicine degree in the University of Granada (UGR) who were enrolled in the subject of Histology. They performed a specific questionnaire which included ten learning methods related to various educational resources. These set of additional training routes were available to be selected by the student: look up on textbook (I) or atlas of photomicrographs (II), seek on the Internet using the Google search engine (III) or the teaching department website (IV), consultation with the professor in person (V) or via email (VI), review of samples through a new specific practice lesson (VII) or as an individual way through the free provision of the samples previously used (VIII), look the lab notebook up (IX) or simply use of their memory (X).

All those items let us know the assessment of the students' response regarding the general question of the priority that each student gives to each training model. The assessment was done in a range that goes from 1 (lowest priority) to 5 (highest priority).

Subsequently, in relation to the results obtained in the previous questionnaire, we used another specific questionnaire prior to the creation of the audio-visual notebook, which combines additional training routes preferred by students. This second questionnaire was completed by one hundred and fifteen students who had participated in the study doing the first questionnaire. The topic of the book dealt with the development of a histological technique required for the identification of a tissue. The reason for this choice was that the technique provides students with a body of knowledge and a set of skills and abilities; it turns out to be a cognitive and suitable experimental material for its incorporation into an audiovisual document.

The questionnaire identifies five groups of items related to different models and means of communication that the student can select, adding a changing value for possible introduction on the audiovisual notebook. The items are the answers to a general question that the student has to evaluate in a Likert-scale that ranges from 1 to 5. The first group of items is related to the oral explanation of the technique by the person who made the histological technique (I), by a professional voice-over (II) or by a student (III). The second group of items is constituted by the message transmission through an explanatory text associated with images (IV) or through texts put into a homogeneous background appearing between one image and another (V). The third group consists of responses that include the possibility of adding background music to the video, this music could be: of any kind (VI), classical music (VII), conventional non-classical music (VIII) or the environmental sound of material laboratory utilization (IX). Finally, the last groups suggested answers regarding musical sound which alternates with intervals of voice (X) or intervals of silence (XI).

In both questionnaires, the results of the most valued against the less valued items by students were analyzed and compared to each other using the Wilcoxon statistical test. To compare the average responses in the group of male students against the group of women students, we used the Student t test statistic. All statistical tests were performed two-tailed, considering significant those p values lower than 0.05, which means 5% level of significance.

3 RESULTS

The results obtained in relation to the first survey conducted, revealed the following scale of priority by students in relation to the various items analyzed. From the highest to the lowest priority they are: the image search on the Internet within the department website (4.06), seek of images in the lab notebook developed by students in their regular practice (3.94), using an atlas of photomicrographs (3.43), the realization of microscopic observations in new sessions practices (3.35), look images up in text books (3.25) and image search in Google (3.07), microscopic self-observation with no time restrictions (2.91), look for assessment in face to face meeting with teachers (2.84) or by e-mail (2.41) and finally, the simple use of memory, without supplementing it with any teaching resource (1.81). The statistical analysis of this data revealed significant differences between the routes associated with the highest scores and those related to lower scores ($p < 0.05$).

When results are analyzed distinguishing the gender of the students, it appears that the average values in relation to the various items are as follows: 3.97 for men and 4.29 for women in the image search on the Internet in the department teaching support website; 3.33 for men and 4.25 for women

in relation to the consultation booklet of practice done by the students in their regular practices, 3.23 for men and 3.63 women regarding the use of an atlas of photomicrographs, 3.23 for males and 3.30 for women in relation to the implementation of new microscopic observations in practical sessions; 3.18 for men and 3.32 for women in search of pictures in textbooks , 2.85 to 2.95 for men and women regarding the use of the Google search engine, 2.82 to 2.86 for men and women in relation to individual microscopic observation with unrestricted time; 2.67 and 2.68 for males and 2.70 and 2.41 for women in relation to the assessment of the teacher personally or by email, respectively, and finally 2.03 for men and 1.73 for women regarding the use of memory, without any didactic complement.

The study found significant differences related to gender in relation to the choice of lab notebook by the students as a prioritized route of complementary learning compared with men ($p < 0.001$) but not for the rest of the items analyzed. Table 1 and Figure 1 represent all the results described.

ÍTEM	TOTAL MEAN	MALE MEAN	FEMALE MEAN	P SIGNIFICANCE VALUE	RELATIVE VALUES
I	3,25	3,18	3,32	0,5554	0,96
II	3,43	3,23	3,63	0,1220	0,89
III	3,07	2,85	2,95	0,7060	0,97
IV	4,06	3,97	4,29	0,1623	0,93
V	2,84	2,67	2,70	0,8860	0,99
VI	2,41	2,28	2,41	0,5955	0,95
VII	3,35	3,23	3,30	0,7808	0,98
VIII	2,91	2,82	2,86	0,9025	0,99
IX	3,94	3,33	4,25	0,0000	0,78
X	1,81	2,03	1,73	0,2169	1,17

Table 1. Average values for each item both in total and stratified by gender in relation to the first questionnaire performed. The last two columns show p values of significance for the Student t test statistic (comparison of means between men and women) and the relative values for the mean divided by the average men and women (see throughout the text to identify the items corresponding to Roman numerals).

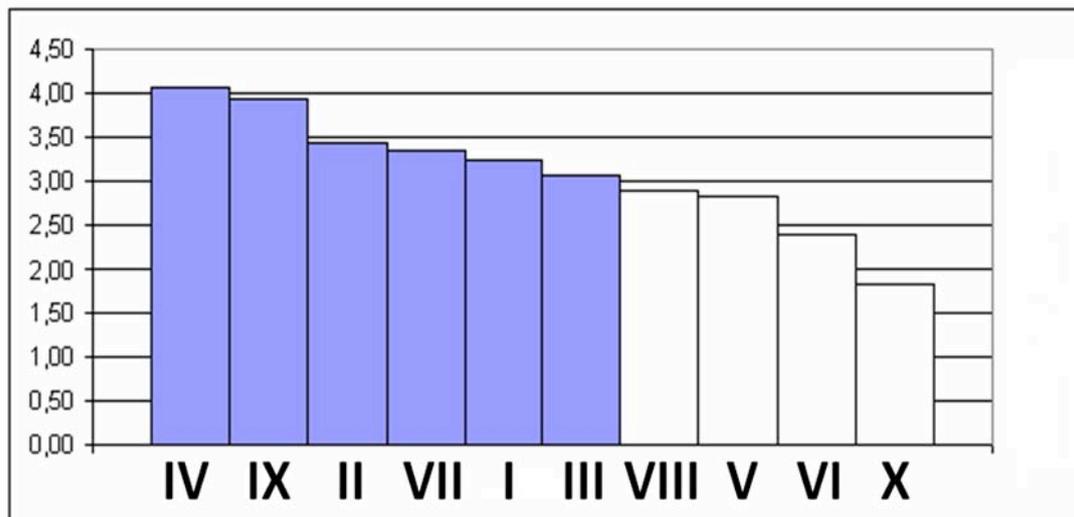


Figure 1. Histogram with the average values of the different items in descending order (see throughout the text to identify the items corresponding to Roman numerals). The difference among the items most valued and least valued is statistically significant ($p < 0.05$).

The results obtained after the completion of the second questionnaire revealed that, in connection with the communication process to develop in the audiovisual book, the main priorities of the students are related to the following items: "communication provided by a professional speech" (3.53), "communication provided by the person performing the technique in documentary" (3.29), "communication provided with text over images" (2.89) and "communication made with background sound" (2.87). The items evaluated with lower scores were: "communication provided by a student" (2.09), "communication made with any continuum musical background" (2.16), "conventional non-classical music" (2.28) or "communication comes with classical music" (2.37). Statistical analysis revealed significant differences between the priorities related to higher scores and lower level ($p < 0.05$).

When results are analyzed by distinguishing by gender, it appears that the average values in relation to the priority items are, successively: 3.52 for men and 3.54 for women in "speech communication provided by a professional"; 3.28 for males and 3.30 for women in "communication provided by the person performing the technique in the documentary"; 2.97 for men and 2.88 for women in "communication provided with text on images"; and 3.05 for males and 2.77 for women in "the making with background sound".

With respect to the least priority items, the values are: 2.03 for men and 2.14 for women in "communication provided by a student"; 2.26 for men and 2.14 for women in "communication performed with any continuum musical background"; 2.54 for men and 2.18 for women in "non-conventional classical music"; and 2.46 for males and 2.34 for women in "communication comes with classical music".

Between the two groups of items presenting significant differences, there are intermediate priorities whose values are: 2.65 for "musical sound at intervals of voice" with 2.74 for men and 2.59 for women; 2.42 for "musical sound at intervals of silence" with 2.51 for men and 2.38 for women; and finally, 2.42 for "text on homogeneous background from one image to another" with 2.15 for men and 2.56 for women. No statistical differences were found between men and women for any of the items analyzed in this study. Table 1 and Figure 1 represent all the results described.

ÍTEM	TOTAL MEAN	MALE MEAN	FEMALE MEAN	P SIGNIFICANCE VALUE	RELATIVE VALUES
I	3,29	3,28	3,30	0,99	0,99
II	3,53	3,52	3,54	0,98	0,99
III	2,09	2,03	2,14	0,66	0,95
IV	2,89	2,97	2,88	0,71	1,03
V	2,42	2,15	2,56	0,10	0,84
VI	2,16	2,26	2,14	0,58	1,06
VII	2,37	2,46	2,34	0,64	1,05
VIII	2,28	2,54	2,18	0,19	1,17
IX	2,87	3,05	2,77	0,28	1,10
X	2,65	2,74	2,59	0,58	1,06
XI	2,42	2,51	2,38	0,60	1,05

Table 1. Average values for each item, in total and stratified by sex. The last columns show, respectively, p values of significance for the Student t test statistic (comparison of means between men and women) and the relative values for the mean divided by the average men and women (see throughout the text to identify the items corresponding to Roman numerals).

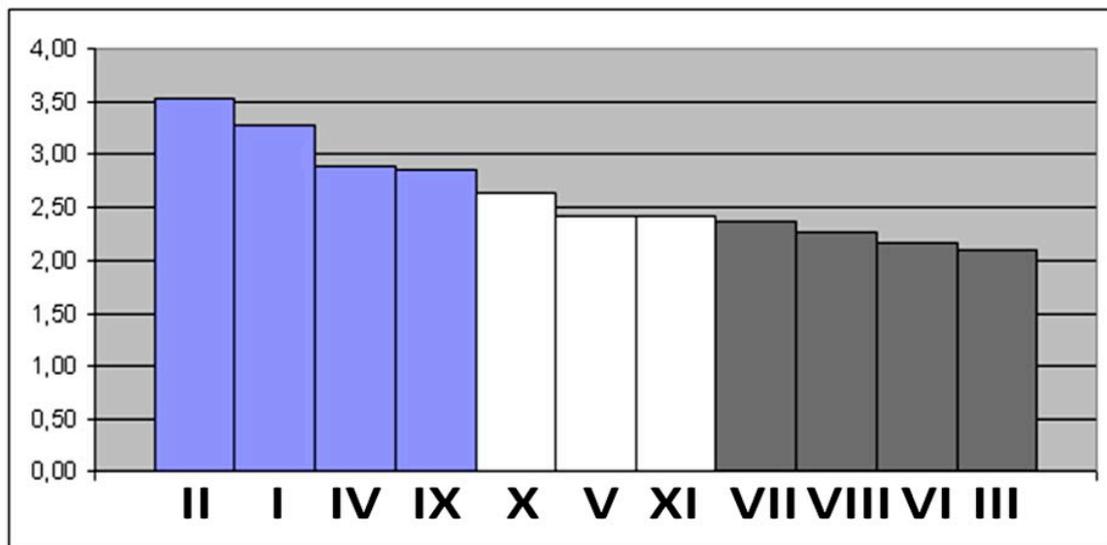


Figure 1. Histogram with the average values of the different items in descending order (see text for identification of items of Roman numerals). The difference between the four most valued items and the four lowest scores is statistically significant ($p < 0.05$).

4 DISCUSSION

The practical activity in terms of Histology could not be reduced to mere observation, identification and descriptions of physical structures through the microscope in a practice room during a certain time. Clearly, the laboratory is critical because it is able to put the student in touch with microscopic reality and to materialize complex and abstract concepts taught in lectures and discussed in the seminars [20]. In previous studies, we have highlighted the improvement in learning that involves the completion of a previous course of histology [7] [21].

In this work, we emphasize the need for additional training after the practical training. In this regard, this paper is focused on the prioritization made by the student in relation to possible available learning methods. The results show that, in the process of complementary training practices of Histology, students preferably prioritize resources related to their own experience of studying and, in this connection they significantly stress the values of two items: on the one hand, the relative to assessment with the board of the teaching department's website, in which teachers upload teaching material, and on the other hand, the item for their own lab notebook. Hence, the need for an element that combines the properties of both of them: the audiovisual notebook.

Secondly, students choose to consult books containing photomicrographs (i.e. histological atlases and textbooks), which combines theoretical information and microscopic images, to attend a new lecture or a consultation practice through generic search engine websites such as Google. Thirdly, the results of the study show that students seek for the help of the teacher, individual consultation of histological samples or they trust their mere memory for their training. The significant differences between the first two levels of values and the third indicate that the priority of the students is headed to methods linked to independent learning more than to the personal interaction.

The importance of self-learning in the context of the European convergence process and the development of European credit are not ignored by people organizing university teaching [22]. For this reason, the fact of emotionally linking the implementation of the European credit to the priorities that emphasize students is extremely useful. However, it is important to note that the process of self-learning that students prioritize could not belong to the context of the systematic approach of self-learning, which requires planning and previous preparation [2].

In the present case, the students firstly selected models more associated with the proximity to their cognition and experience -the training materials provided by their teacher and their own notebook-, selecting in the second place, contrasting authority models -textbooks and atlas-, thirdly using the repetition of the experience with a practice or a new lecture or an indiscriminate search on the Internet. In this regard, it is noteworthy the significant difference that exists in relation to the increased use of lab notebook by women. This is probably related to factors linked to the interests, personality and maturity developed by medical students [23] [24] [25].

The outcomes of the study also highlighted that the less valued priority is related to the trust to remember the practical training received, but it is also linked with active consultation to teachers, which must involve two attitudes: the self-sufficiency and self-conformity of the students and the irrelevance of teachers. The first is due to the fact that students themselves can gain the knowledge and skills necessary to overcome the corresponding evaluation, which is hardly ever comparable with the theoretical evaluation. The second reflects the fact that, in many cases, the teachers assigned to practical training are teachers in professional training or, sometimes, student monitors, as reported by some studies [2]. The results received for these items are also related to the characteristics which contribute to the mentoring model in the Spanish university system. The data from this study clearly invite us to reflect on and rethink about practical activity that currently takes place and the consequences of its projection to complete the training, both through self-learning as the activity to be developed by the teacher.

Regarding the development of an audiovisual notebook with the active participation of students, we assessed the priorities that the students established about the contents of the communication process. The development of self-study has been carried out at two levels: first, through the contribution of students to establish the priorities of the content and implementation of audiovisual notebook and, secondly, through the contribution of students to the definition of the communication model to transmit audiovisual content of the document in different educational activities.

The results shows that, in the process of selecting the transmission resources for the development of the audiovisual notebook, students give priority to the content through verbal communication or text on the additive package adjacent to the core of the message, as is highlighted in the statistical study. This demonstrates that the student, before a proposed multipurpose use and cognitive and sensory stimuli, makes clear the preference of the former over the latter. This should make us reflect on the danger of using audiovisual resources where the content can influence the student's cognitive structure. That means influencing the organization of concepts, ideas and propositions, and could be hidden among sensory proposals that would make the documentary an end in itself from a strictly aesthetic or film perspective [26].

The results also concluded that the priority of the students in relation to the communication process is linked to a transmission that is able to guarantee a professional core of the message contained in the audiovisual booklet to be prepared; in this case, the development of a histological technique. This fact is demonstrated by the fact that those items reaching the highest values are related to the preference for a professional speech or an oral explanation from the person who performs the technique. By contrast, students refuse to be a student who verbalizes the documentary technique, with this item reaching a low value in the questionnaire responses. The priority for the professionalism is also reflected in the high score that reaches the explanation through on-screen texts and linking them with the images that these texts show. According to different researchers, this approach is related to the maturation process described for students who begin medical studies [27] [28].

In relation to the environmental sound, none of the procedures available to students for their selection reaches significant values, except for the environmental sound that is made in the laboratory to develop the histological technique, a consequence of the filming in the audiovisual notebook. Any background music or classical or conventional, is a priority for students in defining the configuration of an audiovisual education [26].

One fact of particular significance in this study is the priority students give to written documents and sound environment. This audiovisual production approaches to teaching and learning that is based on the personal relationship of educational agents as, for example, the lesson in seminar meetings or practical training and therefore, to the different learning strategies with which they are associated [29] [30] [31]. From the results described above, it is very revealing that the responses with intermediate values correspond to items which combine silence and sound voice or no environmental or intervals between text and images.

Although the influence of gender is known in the subject's personality as far as vocational behavior and motivation [32], especially in medical students, our results show no significant differences between both groups as the establishment of audiovisual transmission priorities are concerned.

5 CONCLUSIONS

The students' analysis of the priorities for complementary learning methods in practical training in Histology shows that the students give priority to self-learning methods linked to their experience - specifically, the department website and practice notebook. Secondly, students show their preference for authoritative documentary sources -books and atlases-, against learning paths linked to the relationship with their teachers. Therefore, the audiovisual book could be set as the element that combines the basic properties of the two most valued methods, which must be developed jointly by teachers and students. After analyzing the communication priorities of the students regarding the audiovisual content of the audiovisual book produced in a context of self-learning and the new European credit, we can infer that students give priority to the transmission of content through verbal communication or text, and also prioritize experiential transmission, voice and ambient sounds on the textual transmission.

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