

A BRAZILIAN SITE WITH ACTIVITIES FOR TEACHING STATISTICS

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We describe the site AtivEstat- Atividades de Estatística (Statistics activities) that is being developed at University of Sao Paulo, Brazil. The site aims to organize existing or new activities to assist in the teaching of statistics at all levels. The site contains a list of other sites and a set of activities. The main contribution of the site is to offer an organized material in Portuguese language that covers statistics topics for all teaching levels. An important challenge is to enlarge the number of teachers that promote possibilities of active learning in their classes and, consequently, in the teaching-learning of statistics. We think AtivEstat is an important tool, in this challenge.

INTRODUCTION

Since the 1990s, the Brazilian Federal Government has introduced guidelines for the basic education system through the National Curricular Parameters- NCP (Brasil, 1998/2002). There are also suggestions to prove the teaching-learning processes of statistics, which is included as a topic in mathematics courses. In this way, in Brazilian middle and high schools, basic Statistics concepts are taught by mathematics teachers that, usually, have a degree in Mathematics Education or in Physics and Science. To obtain their degree these teachers may have taken one or two statistics courses in the curricula. Despite this, most teachers do not feel comfortable to teach statistics issues. For an overview of statistics presence in Brazilian basic education, one can refer to Campos et al. (2011), Lopes et al. (2010) and Coutinho (2013).

At undergraduate level, several careers have statistics courses in their curricula. In general, at the public universities, these courses are taught by professors with a PhD degree in Statistics or close knowledge areas (see Louzada et al., 2010). In this case, it is supposed professors have no difficulties with statistics contents to teach, however due to the pressure to research papers publishing, the central focus might not be on classroom teaching-learning improvement.

The web provides a huge amount of information. The major concern is how to select contents teachers are looking for. It is necessary time and knowledge to do an adequate selection from the available material. Also, the language could be an important restraint in this issue.

In order to accomplish the task of better statistics courses at any level, statistics education researches have produced, and continuing to do, several suggestions as mentioned in Garfield & Ben-Zvi (2008) and Salcedo (2013). Among them, illustrating concepts and using numbers in real context, providing an adequate environment, are important issues to improve statistical knowledge, as well as to enhance motivation and students' participation in the learning process.

In this direction, the website *AtivEstat- Atividades de Estatística (Statistics Activities)* is being developed at Mathematics and Statistics Institute- University of Sao Paulo (IME-USP), Brazil. The site is directed mainly to teachers which we expect to have some familiarity with the subject, since there is no formal discussion of statistics concepts. Even though students' knowledge is the final objective, all writing of the site is directed to teachers, not to students.

The team that developed the site consists of two students, supported by a fellowship, and the coordinating professor. Neither of them has computer expertise, so the computational job was developed by the IME-USP staff. For the students in the team, the site development was an important learning experience, since they had to look to dozens of sites and activities in order to evaluate them, to decide on their inclusion, or not, in the site. It is important to mention that, among others, international sites as *CensusAtSchool* and *CAUSE* and Brazilian sites as *IBGE (Vamos Contar)* and *AVALE* were, and still are, sources of motivation and inspiration to our work (see sites addresses after References). At the moment, it is available an initial version of the site that still needs to evolve contents and layout. Next sections present more details of the site.

NEW SITE TO STATISTICS CLASSES

The site *AtivEstat* (www.ime.usp.br/ativestat) contains a list of related sites and a set of activities. In order to help users to choose adequate material in the listed sites, we included a brief description of their contents. Also, for each activity in the site, information is provided to help the user to choose activities related to the education level and the topic covered. To set activities to different education levels, we are based on the National Curricular Parameters- NCP (Brasil, 1998/2002), and Magalhães & Lima (2013), respectively, for basic school and college levels.

Activities were included in *AtivEstat* after research and the selection in several internet portals. They were chosen according to topic, accuracy concepts, simple implementation and adaptation to Brazilian contexts. Activities, either come from other sites, or were created by the team members. For activities from other sites, *AtivEstat* shows the respective links in order users can access the original sources. Also, some activities were adapted concerning Brazilian daily life.

The activities are organized into topics, education levels and types of activity. Four statistical topics are considered: *Tables and Graphs*, *Summary Measures*, *Probability and Models*, and *Statistics Inference*. It is possible to use an activity in different teaching levels, and also some activities could be related to more than one statistical topic. Educational levels are divided into *Elementary and Middle schools*, *High school* and *College*. Five types of activities, detailed ahead, are considered: *Classroom use*; *Spreadsheets*; *Project proposals*; *Films and videos* and *Applets*.

In the initial page of *AtivEstat* there is an introductory text for teachers, describing the portal main objectives and contents. At the top left we can find three icons that give the main structure, *Activities*, *Related sites* and *Contact us/ Team*. Figure 1 shows this page:

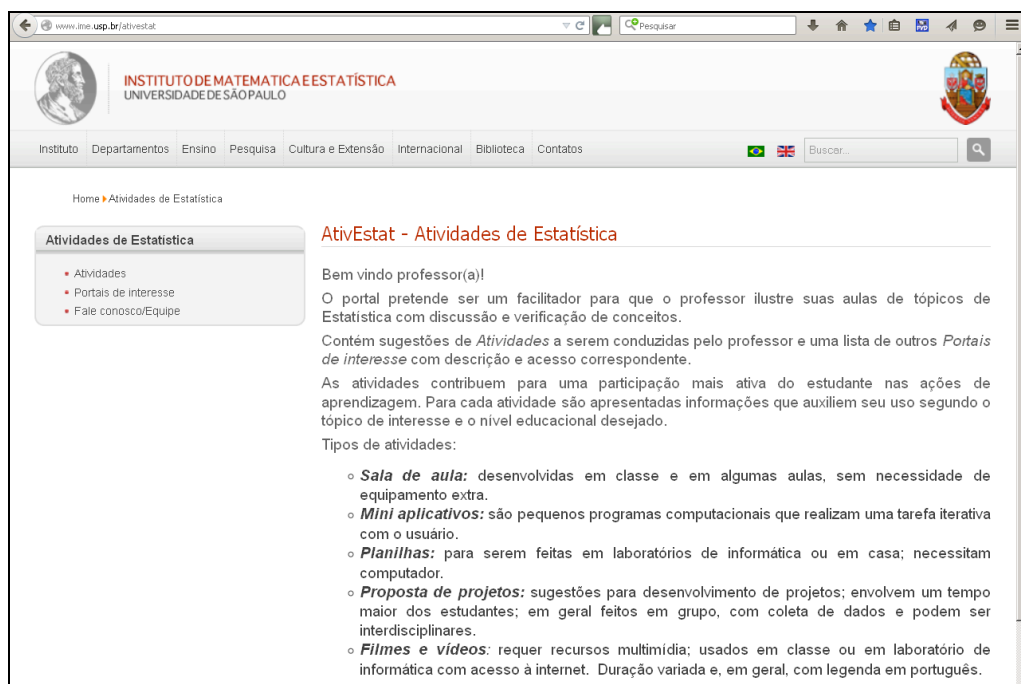
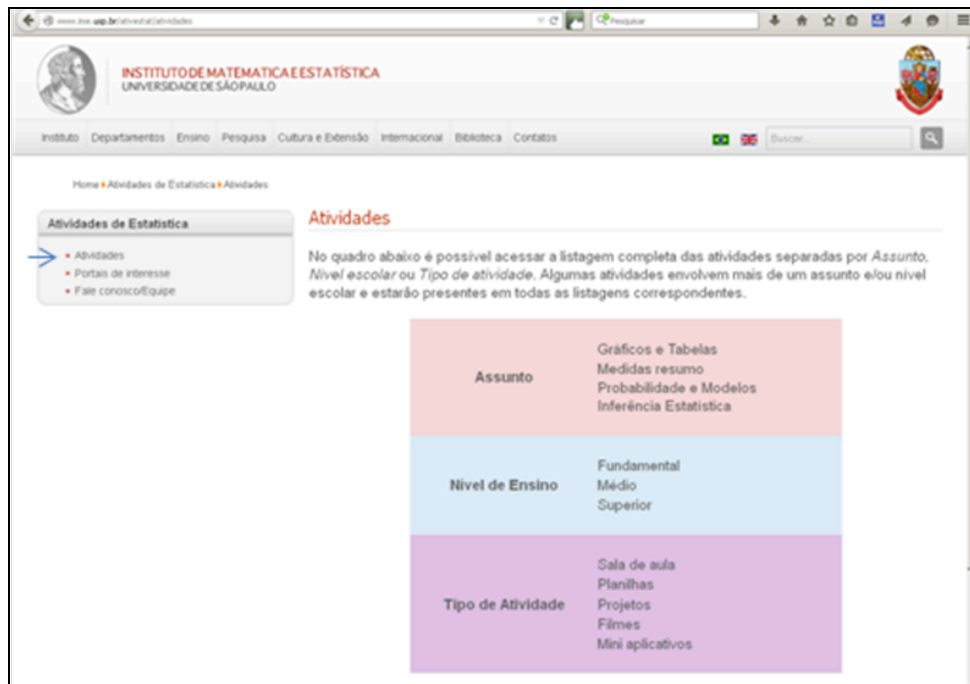


Figure 1. Initial page of *AtivEstat*

SITE ATIVESTAT- ACTIVITIES

Moving to *Activities* icon in initial page of *AtivEstat*, we access the page showed on Figure 2. In this page one can choose filter by *topic*, *educational level* or *type* of activity. A click on *topic* or *educational level* shows a list of activities separated by *type*.

An important *AtivEstat* feature is to provide information in Portuguese language on the activities, even if they are written in other languages. The kind of information presented in the site depends on the activity type. Next, we present details for each activity type.

Figure 2. *Activities* page

Classroom use

These activities are intended to spend few hours, in general completed in one or two regular class meetings. They use simple material resources as paper cardboard, colored balls, boxes, ruler, and colored pens. Hitting *Sala de aula*, in the *Activities* window, it will appear a list of all activities of this type. There is an activity code, its name and a link to a window with the activity description (*descrição* in Portuguese). Figure 3 shows an example referred to activity SA09: Carlinha random walk ([description](#)).

SA09: Passeios aleatórios de Carlinha ([descrição](#))

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SA09: Passeios aleatórios de Carlinha
Tópicos: Gráficos e Tabelas, Probabilidade e Modelos.
Recursos: moedas, canetas coloridas, laboratório de informática (opcional).
Nível de ensino: Fundamental e Médio.
Duração: 4 horas-aula.
Resumo:
 É uma proposta do projeto AVALE (Ambiente Virtual de Apoio ao Letramento Estatístico) para estimular os estudantes a compreender probabilidade. Carlinha quer visitar seus amiguinhos, mas só pode se mover para o norte ou para o leste. Cada movimento é decidido pelo lançamento de uma moeda (que é assumida como equilibrada). Dependendo das direções escolhidas em cada movimento, ela consegue visitar um dos seus amigos. No desenvolvimento da atividade, os estudantes fazem experimentos simulando o passeio e constroem gráficos e tabelas com a frequência relativa. Ao final da atividade está previsto formalizar os conceitos probabilísticos envolvidos.
Mais detalhes:
<http://ambiente.educacao.ba.gov.br/conteudos/download/1622.pdf>

Figure 3. Description for *Classroom use* type of activity

As showed in Figure 3, for this type of activity, the description includes *Topics*, *Resources*, *School level*, *Duration*, *Summary* and *More details*. In this case, *More details* brings a link to AVALE site to get more information to apply the activity. There are cases in which we produced a pdf file with additional information and that link will pointed at it.

Spreadsheets

For these activities type, it is necessary to use computers, either at home or in a lab. The tasks inserted will explore resources present in spreadsheets of commercial or free software. The activities provide students context to obtain graphs, calculate measures and perform simulations using random numbers generation. *AtivEstat* brings in *Spreadsheets* type, the same kind of information presented in *Classroom use* type of activity.

Project proposals

As the name indicates, these activities were thought to bring students' suggestions for group work using statistical tools. The Projects suggested may take several weeks with tasks in and out classroom environment and they also could provide an interaction with other disciplines. Also, for each *Project proposals* activity, *AtivEstat* presents similar information as the ones in *Classroom use* type of activity.

Films and videos

Films can motivate students in several statistical issues. For each film listed, there is a link with internet address. Also a description is provided. Besides the usual information, in this case, the description includes language and suggestion how to use the films, class organization and questions to be focused on. Figure 4 shows an example, FV15: Each graph in your branch tree ([link](#), [description](#)).

FV15 – Cada gráfico no seu galho ([filme](#), [descrição](#))

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FV15 – Cada gráfico no seu galho

Tempo de exibição: 10 minutos.
Ano: 2012
Idioma: Português.
Tópicos: Gráficos e tabelas.
Nível de ensino: Fundamental, Médio e Superior.
Resumo:
Neste vídeo, do projeto Matemática Multimídia da Unicamp, uma funcionária em seu primeiro dia de trabalho sente dificuldade em analisar alguns gráficos que seu chefe pediu. Deste modo, seu chefe irá ajudá-la explicando algumas utilidades dos diferentes tipos de gráficos.
Sugestão de atividade (50 minutos):
Após assistir o vídeo, com a classe dividida em grupos, solicite a resposta das questões abaixo. Em seguida, reúna a classe e discuta as respostas de cada grupo.

- a) Cite três pontos que mais lhe chamaram a atenção no vídeo.
- b) Qual dos gráficos apresentados você utilizaria para resumir a sua evolução escolar, ou seja, analisar em um período de tempo suas notas ou médias escolares?
- c) Qual dos gráficos apresentados, você utilizaria para mostrar o interesse de seus colegas por matemática?

Fonte: <https://www.youtube.com/watch?v=cN1I2te79Ck>.

Figure 4. Description for *Films and videos* type of activity

Applets

These activities use small computer programs to illustrate concepts, to draw graphs, and to measure calculations. They allow important statistical concepts discussions, saving time from calculations and manual draws. For each Applet, a summary and internet address is provided.

SITE *ATIVESTAT*- RELATED SITES

By clicking the second icon from the initial page of *AtivEstat*, we reach a page with a list of several portals. The list contains most of the sites sources used to build *AtivEstat*. The list helps teacher's pursuit of other activities and also serves as an outreach page of the different sites on Statistics. *AtivEstat*, first, lists Portuguese, then Spanish and finally, English sites. Within the available languages, the sites were listed in alphabetical order. Figure 5 shows this current page in *AtivEstat*.

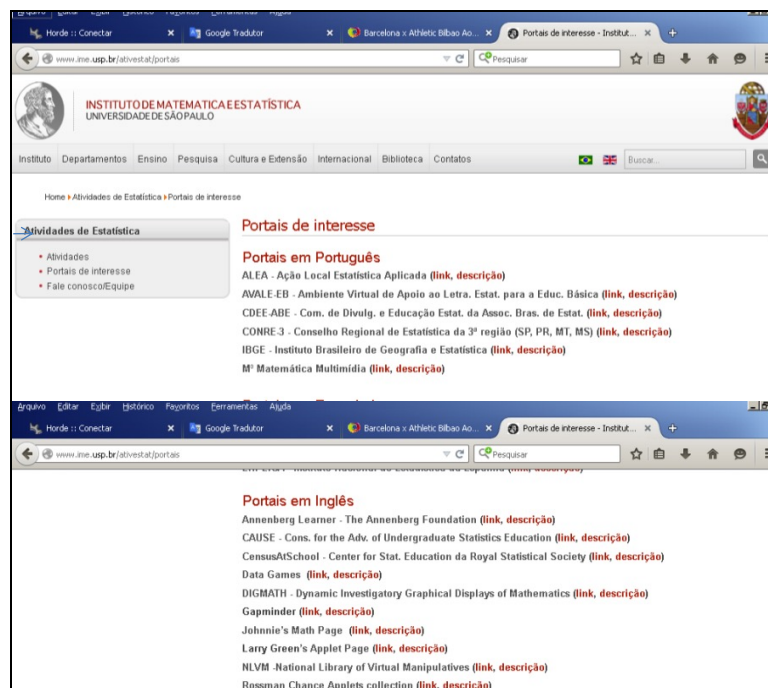


Figure 5. Related sites in *AtivEstat*

CONCLUSION

This new Brazilian site *AtivEstat* presents a description of activities and related sites to help teachers in their statistics classes, in Portuguese language. Division by categories of educational level and statistical topics intended to facilitate its use by teachers. However, it is quite common an activity to be applied in different levels or to be included into two statistical topics. So, classification must be seen as a guide to search, not a strict rule.

The inclusion of sites and activities in *AtivEstat* site will be a continuous process. The current version must be understood as a starting point, we realize that still remain important contributions to be incorporated in the sequence. Some of the activities already selected, were not included yet, because they are still in a construction process, since identified a site or an activity to be included, it is necessary to write the respective information in the correspondent format.

We realize there are a lot to do in order to improve the site layout and contents. Besides, we intend to create a collaborative relation with statistics teachers, from all educational levels, around the country, to obtain not only critical opinions but also new ideas to add to the site. To stimulate teachers, particularly the ones from basic schools, to use the site, we intend to promote workshops discussing statistical concepts and spreading out *AtivEstat*.

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SITE ADRESSES

AVALE: <http://avale.iat.educacao.ba.gov.br/>

CAUSE: <https://www.causeweb.org/>

CensusAtSchool: <http://www.censusatschool.org.uk/international-projects>

IBGE (Vamos Contar): <http://www.ibge.gov.br/home/>