

PUCRS

MAGAZINE

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Actions in support of education
and promotion of citizenship
in a local community

Relics in the
basement of
the Museum

Biobank stores
samples of human
organic material

Energy from nature

Renewable sources
such as solar and
wind power, and
biofuels attract the
attention of researchers



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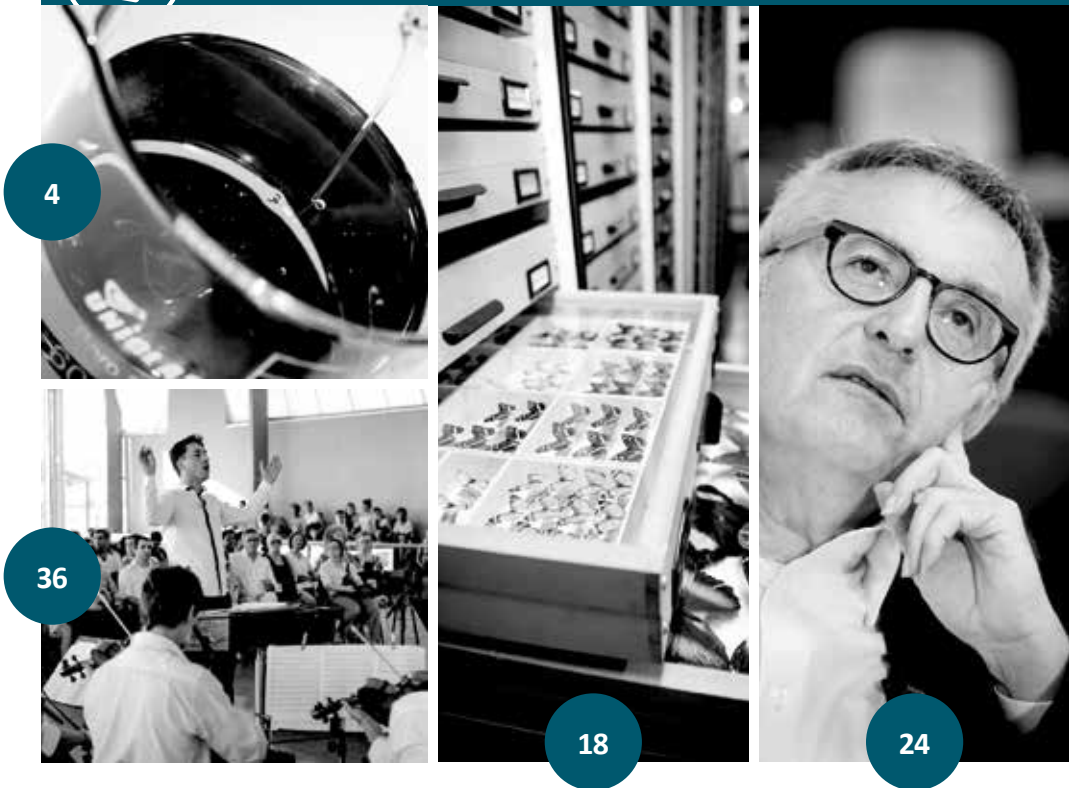
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Eder Henriqson, Dean of Undergraduate Studies



Our challenge is as great as the future

As great as the future – that is what our advertising slogan says. At PUCRS, the future is envisioned, planned and constructed collectively. This is how our Strategic Plan 2016-2022 has been designed, aiming at a new period of institutional growth that will be dynamic and audacious, aligned with our aspirations, and the reality and demands of society, which will continue to require collective contribution. Our Mission, Vision and Reference Framework will keep guiding the projects, activities and commitments of the University.

The passing of time imposes readjustment, change and challenges, in order to maintain the excellence levels achieved in teaching, research, extension and in the areas of innovation and health. Since its foundation, the history of PUCRS has been characterized by effort and hard work, continuous improvement and the recognition from the society and governmental agencies. We will move forward, bearing in mind the efforts of those who have preceded us and are worthy of our gratitude.

It is worth highlighting the irreplaceable role of the University in social development, in improving the quality of life, and in its contributions to culture, citizenship and environment. We are highly committed to the improvement of our society, particularly in the areas of Education, Health, Science, and Technology, aiming to blend Hard Sciences with Humanities.

The University is and should continue to be a strong presence in society through the quality of its programs, faculty, researchers, administrative technicians and alumni. This undoubtedly requires the involvement of the whole university community.

PUCRS has a primary commitment to the evangelization of culture – the dialog between science and faith –, with religious practices undertaken freely, and with the integral education of persons, which should be strongly permeated with the values of integrity, justice, solidarity, voluntarism, respect to the property of others and the care with nature. All of these are fundamental

attitudes, which should be cultivated throughout university training.

A significant example of the dimension of the University's future is the seven new Schools that will house the courses and programs currently grouped in 22 Schools. The first new School to be established will be the School of Humanities, which, under the direction of a Dean, will group the Undergraduate Programs in Theology, Philosophy, Psychology, Education, History, Geography, Social Sciences and Social Work, as well as the *Stricto Sensu* Graduate Programs in Philosophy, Theology, Psychology, History, Social Sciences and Social Work.

The dimension of our future must be based on three important guidelines: the consolidation of the strategic positioning through Innovation and Development, the institutional distinction through academic excellence, and the promotion of internationalization, favoring knowledge and use of the English language, which is currently the language used in science and development.

We believe and reaffirm that a consolidated and honest democracy, as well as a strong economy, are rooted in education, and, particularly in the excellence of Higher Education. Knowing that the dimension of the future at PUCRS depends on each of us makes us stronger and increases our responsibility. This is our challenge.



Joaquim Clotet

President of PUCRS



*Biodiesel presents
the same autonomy,
power and electrical
performance of
diesel*

**Research
conducted at
PUCRS uses
renewable
energy
sources**





PHOTO: ARCHIVE

Aeromovel will cross the Campus using electricity and biodiesel generator

Searching for efficiency and sustainability

Developing sustainable technologies and knowledge makes it increasingly possible to generate efficient energy with less environmental impact. Several Schools, Institutes, and Research Centers at PUCRS invest in projects that use renewable sources such as solar power and wind power, and biofuels derived from plants.

The School of Engineering (Feng) conducts studies on biodiesel, hydrogen, CNG, and ethanol. At the Laboratory of Engines and Alternative Fuels, the use of biodiesel in generator-engines is an Undergraduate Research Project and theme for Master's theses. The equipment, which converts mechanical energy into electricity, is the same used in buildings during power shortages. The goal is to analyze the power generation performance and greenhouse gas emissions when compared to conventional diesel.

The research, which started in 2014, has shown that biodiesel has the same autonomy, power and electric performance of diesel, in addition to reducing greenhouse gas emissions by around 12% compared to natural greenhouse gases. Consumption is slightly higher, but it remains under 5%. Testing was carried out with pure biodiesel and with different mixtures of biodiesel (75%, 50%, 30%, 20% and 7%). Conventional diesel contains 7% biodiesel. As biodiesel percentages increase, pollutants decrease, but consumption rises.

According to Carlos Alexandre dos Santos, laboratory coordinator and Dean of the School of Engineering, the biggest issue with replacing diesel entirely with biodiesel is that the process of producing the latter is still more expensive (by around 30%), and the current productive capacity does not meet the country's demands. "The idea is to apply these results to the experimental aeromovel line that will be installed at PUCRS. It will be powered by electricity and biodiesel generator," says Santos. Construction should begin in 2016 and the route will start at Irmão José Otão Foundation and end at the Sports Park.

In another research project, the laboratory is analyzing the performance of vehicle engines, using the same biodiesel graduations to determine torque, power and consumption. Results have shown a 5% decrease in all items and an increase in consumption at the same rate. "It is in the tolerable range as far as benefits for the reduction of emissions. Even so, it is still possible to find a mixture that will allow for more power and less consumption," says Santos.

Biodiesel is not the only concern in the research scope of the School of Engineering. Two urban waste collection trucks in Porto Alegre were tracked for two years to monitor the greenhouse gas emissions, one powered by compressed natural gas (CNG), and the other one by diesel. Not only was CNG cheaper, but it also decreased emissions by around 20% to 35%.

The goal is to create the Advanced Laboratory on Biofuels at Tecnopuc Viamão.

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Homemade energy

Since November 2014, the Federal government has allowed consumers to send the unused energy produced by home solar panels and wind generators back to the power grid. With Resolution no. 482 of Aneel (Brazilian Electricity Regulatory Agency), it is possible to maintain a positive balance in the electricity bill, with credits that are valid for up to 36 months. Thus, the client would only pay the surplus used if his/her energy consumption was greater than the surplus produced from sustainable alternatives.

Jorge Villar Alé, coordinator of the Wind Energy Center (CE-Eólica), believes that the measure will stir up the market for the

Testing in the CE-Eólica wind tunnel



production of small wind turbines by increasing demand. Before they reach consumers, the equipment must undergo a series of tests and standard and certification processes. For four years the Wind Energy Center has consolidated methods to evaluate the aerodynamic and structural performance of wind turbines, through a CNPq project, and now it can assist manufacturers interested in improving their products by testing the quality of their blades and electric generators, to obtain mechanical and resistance measurements. This is carried out partly in the laboratory itself, using the wind tunnel and computer programs, and partly in field trials.

It is possible to perform aeroelastic modeling using software that applies features of the tested blades to obtain a performance curve and establish how they would behave with a determined wind speed, their efficiency and power. The aerodynamical coefficients of wind turbine torque and power may be verified on the field and in the laboratory.

The Wind Energy Center currently works in partnership with researchers from Coimbra University (Portugal) for a comparative analysis (computerized and experimental) of aerodynamics of airfoils used in the wind industry. Two computer codes are used: EasyCFD_G and OPENFOAM. Inaugurated in 2007, the Center is a ramification of the Energy and Environment Technology Nucleus, and has already welcomed students from France, Germany, Switzerland, Mexico, Luxembourg and Spain.

Feng Eco Racing

The current scenario of energy shortage has encouraged a group of students of Mechanical Engineering to develop an energy-efficient prototype vehicle powered by ethanol, with the support of Professor Sérgio Barbosa Rahde, from the Laboratory of Engines and Alternative Fuels, and of the Dean of the School of Engineering, Carlos Alexandre dos Santos. Feng Eco Racing was created by a multidisciplinary team to design, build and test the prototype. The group plans to take part in the University Marathon of Efficient Energy Use in December, in São Paulo, and in the Shell Eco-Marathon, in Detroit (USA), in April, 2016. The goal of the competitions is to run the largest possible distance with the same amount of fuel (one liter).

The leader of the project, an undergraduate student in the 7th semester, Anderson Antunes de Paulo, reveals that the choice for lightweight and resistant parts, which are used in F1 cars, is aimed at decreasing consumption as much as possible. They chose ethanol

because of its plant origin, thereby eliminating cyclic CO₂, which was already present in the atmosphere before it was absorbed, and later released back into the burning fuel. "We are looking into the possibility of using coconut fiber to build the driver's seat. The more reusable and sustainable, the better," he says.

De Paulo has created a marketing project and began to seek supporters. He relied on the School of Communication (Famecos) for the creation of the visual identity of Feng Eco Racing. Eight students, from the Mechanical Engineering, Control and Automation Engineering, Production Engineering, Chemistry, and Advertising Programs, are part of the team. They have a hands-on approach, which means everyone helps building the prototype. "We work on developing sustainable technology and knowledge. We began in the second semester of 2014, tested theories, tested the School of Engineering's software and carried out simulation. We want to test the prototype by November," he says.

Before assembling the car, a 3D model at 1:20 scale will be printed to carry out testing in the wind tunnel of the Wind Energy Center.

Anderson de Paulo wants to decrease fuel consumption as much as possible



Power that comes from the sun

Brazil is a country with great potential for producing electricity from photovoltaic cells, benefiting from its geographical location, for possessing a territory abundant in silicon (raw material used to produce the devices), and for the limitless power of the sun. As the consumer market grows, it will enable the existence of a national industry. For this, knowledge and cutting edge technology are necessary.

The Technology Nucleus in Solar Energy (NT-Solar), of the School of Physics, created at the end of the 1990s, was groundbreaking by virtue of developing the most efficient solar cell in Brazil of its time. Today, it goes deeper into studies to increase the efficiency of its production through the intellectual property protection of its discoveries and the expansion of agreements and interinstitutional and international partnerships. In 12 years, 27 dissertations and nine theses have been defended in the fields of Physics, Engineering, Chemistry and Mathematics.

Recently, NT-Solar has concluded two projects in partnership with CEEE (State Company of Electricity) and one with Finep (Financing Agency for Studies and Projects), focusing on industrial processes, and reaching a higher solar cell efficiency without high production costs. One of the CEEE related studies with aluminum doped p-type substrate has resulted in a typical industrial process, with an average equal or superior to international standards: around 16%. The second project has addressed the current industrial challenge, which is dealing with thinner bifacial blades, 150 micrometers in size, with p- and n-type substrates, and optimizing processes. Results showed efficiencies of 14.7% and 13%. "Cells with this technology have proved equal to or better than the scientific publications so far," says Izete Zanenco, NT-Solar coordinator.

The project funded by Finep used an n-type substrate, which shows less degradation with solar radiation. It is made up of very thin silicon blades, 200 micrometers in size, doped with phosphorus. This is not the predominant cell type in the industry, representing only about 4% of cells, but it is seen as a way of increasing solar cell efficiency. "We have developed a different structure, forming a p-n junction at the posterior part of the silicon blade, due to cheaper production costs, and also because it is more similar to industrial processes. It was an investment of BRL 2 million, and four years of research. We have reached an efficiency of approximately 14.8%," highlights Adriano Moehlecke, also a coordinator at NT-Solar.

In August 2014, the nucleus started a project with Eletrosul, investing around BRL 1.4 million and involving four Master's students of the Graduate Program in Engineering and Materials Technology. The goal is to deposit thin films on the surface of the solar cell to increase its efficiency. "We will try different materials.

We are going to Spain to produce some anti-reflective films, a material transparent to solar radiation," says Izete.

In CNPq projects, tests are carried out with solar cells produced with new techniques that generate patent applications. "The first cells with selective emitters we have manufactured are being finalized and evaluated. We have tested for stability and lower degradation by aging the photovoltaic modules with n-type solar cells," says Izete. Because of their research, NT-Solar has now six pending patents being analyzed by INPI (National Institute of Industrial Property).

According to the coordinator, the idea of patenting is to enable companies to produce in large scale. "We are trying to enable industry in the country, but this does not depend solely on us. There are several factors. Many of these patents may be more of international than national interest, which is where the industry is more focused now. We have the technology and we are preparing people, equipping companies that wish to be consolidated. As a University, we play our role in developing technology and training human resources," she says.

Internationalization is also a priority: there is interaction with the three main research groups of photovoltaic devices at MIT (USA) and two Spanish laboratories (Technical University of Madrid and University of the Basque Country). In Brazil, the Military Institute of Engineering of Rio de Janeiro is also a partner. NT-Solar has already been visited by one American professor and one American student, and now the plan is to send a Physics student to do part of his/her Master's degree program there.

*Izete and Moehlecke:
searching for efficiency
and low cost for solar cells*



PHOTO: BRUNO TODESCHINI

Advanced laboratory

The production of biodiesel from used frying oil is developed in partnership with Promobio – University-School Interaction Project for Research and Dissemination of Knowledge on Biofuels and Oil, of the School of Chemistry (Faqui). The raw materials come from the Technical School of Agriculture of Viamão, collected by high school students. While Chemistry students produce biofuel from the residue, Engineering students perform tests in generator-engines to measure energy

production, and emission of chemicals such as carbon monoxide, carbon dioxide, nitrous oxides, hydrocarbons and sulfur, as well as the fuel consumption.

Analyses are carried out with different mixtures, from B5 (the one with the least percentage of biodiesel, and the rest composed of normal diesel) to B100 (biodiesel only). The results reveal that B20 is the perfect percentage in terms of costs, fuel consumption and power generation. In environmental terms, to

control greenhouse gas emissions, the ideal mixture is B100. The next step will be to carry out tests with variable load engines.

The project spawned the extension course on Biofuel-Powered Energy-Efficient Vehicle Prototypes. From this study, the goal is to create the Advanced Laboratory on Biofuels at Tecnopuc Viamão. "The area, close to 400 square meters in size, will be used by both schools," says Santos.



Far beyond genetic inheritance

Experiments with a lineage of obese animals show that if a pregnant individual is given foods rich in folic acid, such as broccoli, the offspring will be born normal. This is an example of epigenetic studies presented by Canadian professor Timothy Bredy, from the University of California, Irvine (USA), during his stay at PUCRS. Similarly, because the mother is the newborn's first reference, she is the first contact with the exterior, and their relationship will be relevant to what the child will expect from others. "When the environment is very stressful, it messes with the baby's internal world, and makes it behave differently," says the Canadian professor.

Developmental Cognitive Neuroscience Group, led by Professor Rodrigo Grassi de Oliveira, with Timothy Bredy (R)

Bredy's research shows that DNA is not as stable as previously thought. It takes

generations for the genetic code to change, but habits and experiences throughout life can be transmitted in just one generation. Several factors can silence or intensify the expression of certain features, including lifestyle, social interaction, nutrition and exposure to drugs. He and his team worked at the University of Queensland, Australia, and discovered a way to inhibit one of the genes responsible for fear response. "The main goal of our research is to understand how epigenetic mechanisms can contribute to the formation and maintenance of long-term memory, particularly in cases of psychiatric problems, such as phobias, post-traumatic stress disorder and drug addiction," he explains in his website www.qbi.uq.edu.au/group-leader-bredy.

Bredy will be carrying out research for three years along with the Developmental Cognitive Neuroscience Group, from the School of Psychology of PUCRS, led by Professor Rodrigo Grassi de Oliveira, through the Science without Borders Program –

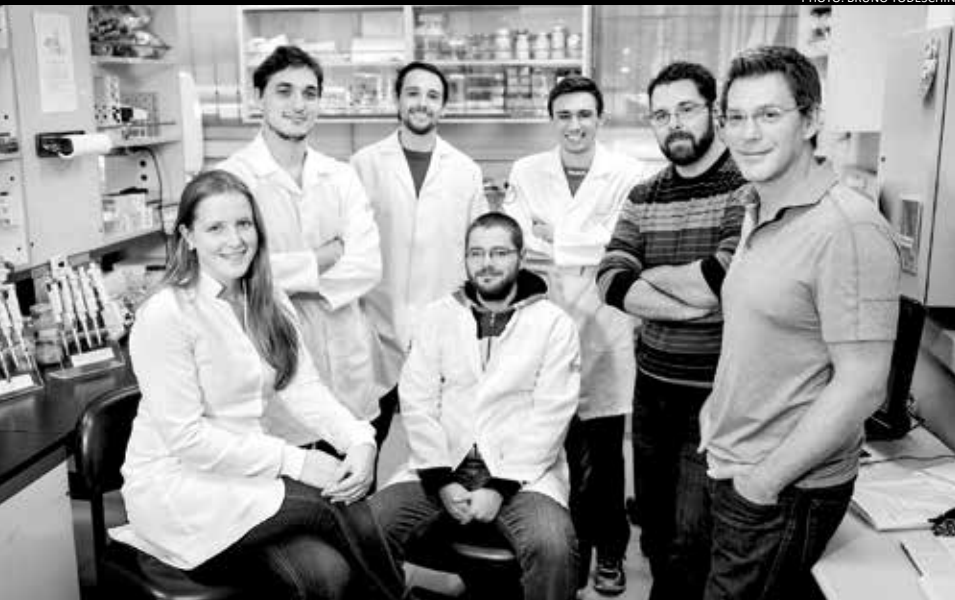
Special Visiting Researcher program. He will contribute to the project that investigates how the lack of maternal care (negligence or abuse) interferes in future development. Experiments performed on animals presume that those who are deprived of their mother's presence tend to relapse more often into drug abuse.

"By the end of the partnership, it is expected that PUCRS will have become part of an American cooperation network of epigenetics researchers," says Grassi. Bredy is part of an international project aimed at investigating neuroepigenetic aspects relating to cognition. "This is a paradigm shift. For a long time, we have searched for specific information in genetic codes to see how it could be explained in terms of phenotypes. Between this code and the expression of the feature, several molecular processes happen, which is the epigenome," explains the PUCRS professor.

Such cooperation will allow students from Australia and the USA to come to PUCRS. Thiago Viola and Luís Eduardo Wearik, doctoral students of Pediatrics and Child Health at PUCRS, will be traveling to the University of California – Irvine to prepare part of their dissertations. At Bredy's laboratory, they will learn techniques to manipulate epigenetic changes aiming at silencing or overexpressing certain features. The technology will be transferred to the Developmental Cognitive Neuroscience Group. Between 2017 and 2018, the Canadian will return to PUCRS, along with Xiang Li, a Post-Doctoral student.

Biomedical Doctor Lucas Azeredo, a scholarship Post-Doctoral student, is also part of the team. A Doctor in Genetics, he is responsible for bench research. At the same time, he studies Medicine at PUCRS. He wants to become a psychiatrist and combine basic research with clinical practice. Bruna Baldasso, a Psychology student, and Rodrigo Orso, a Physiotherapy student, have undergraduate research scholarships.

PHOTO: BRUNO TODESCHINI



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What is epigenome?

To discover the cure of diseases such as cancer and Alzheimer's, mapping the human genome is not enough. Cataloging genetic modification produced by environmental influences and habits is the goal of Human Epigenome Project, a project conducted by a consortium counting on public and private collaboration. Epigenetic heritage, which may be passed on to children, depends on chemical changes that happen in DNA. For example, the addition of a methyl group to a DNA molecule may lead to the silencing of several genes. The genetic code does not change, but there are changes in cellular features.

Consequences of the lack of maternal care

Research carried out by the Developmental Cognitive Neuroscience Group among crack users points out that negligence and abuse in childhood could lead to substance abuse. The research coordinator, Professor Rodrigo Grassi de Oliveira, says that the partnership with Timothy Bredy will be an opportunity to build a bridge between what is experienced in clinics and experimental investigation. "Basic research is essential so that we can have new medication or new forms of intervention in the future."

In the most recent project, with Bredy's participation, animals are separated from their mother, for a few hours, in the first few days after they are born. Preliminary conclusion has shown that the lack of maternal care at the beginning of development may increase vulnerability to substance abuse. "We will attempt to discover which mechanisms could explain the effect of precocious stress on child development." Grassi met Bredy during his Post-Doctoral studies in the field of epigenetics, carried out in Australia.

What effects does maternal care have in drug addiction? Could dietary habits of pregnant women prevent their children from becoming obese? How could negligence and abuse affect brain functions of children and their future behavior? These and many other questions and possibilities of research and treatment arise from an international partnership between PUCRS and University of California – Irvine (USA).

Negligence and abuse during childhood could lead to substance abuse



PHOTO: PUCRS ARCHIVE



Survey shows that students of public institutions feel unsafe, while the ones in private schools are more exposed to cyberbullying



Student engagement influences school

Student engagement and the teaching techniques of teachers are essential to a good school atmosphere. In public institutions, insecurity is among the negative factors mentioned by students. In private ones, they cited more often the exposure to cyberbullying. These are some of the results of a study conducted by the Research Group in Interpersonal Relationship and Violence: Clinical, Social, Educational and Virtual Contexts, of the Graduate Program in Psychology. The main aim of the group is to prepare a transculturally adapted Portuguese version of the Delaware School Climate Survey-Student scale, by American Professor George Bear. This tool will then help to perform a thorough and sound diagnosis on how students perceive their study environment. In the state of Delaware (USA), the study comprehends 79% of public elementary and high schools. After the survey conducted by PUCRS, one of the involved schools has decided to use the data to perform interventions.

The study interviewed 436 students aged 9 to 18 from two private schools (50.5% of the respondents) and four public schools, in the cities of Porto Alegre, Gramado and Viamão. The idea now is to increase the number of respondents – reaching 3,000 – and to include parents and teachers. The group was chosen by the National Council for Scientific and Technological Development (CNPq) to continue the project. Later, jointly with the University of Delaware, represented by Dr. Bear, a comparison will be carried out with the results of similar surveys in the US and China. In addition to authorizing the use of this scale, Dr. Bear has supervised the survey in Brazil. He was at PUCRS and visited a few schools in the second semester of 2014. He was especially shocked by the rates of grade repetition (25% of respondents had to repeat their grade at least once).

Some of the consequences of this are visible in the interviews. These students have shown more negative rates concerning respect to diversity, clarity of expectations,

fairness of rules, school safety, social-emotional learning techniques and cognitive, behavioral and emotional engagement. “This indicates that repetition affects the students’ academic performance and attitudes, as well as their values regarding the institution,” says the coordinator of the PUCRS research group, Professor Carolina Lisboa.

In the USA and in China, bullying is directly related to the school climate. The professor was surprised with the results in Brazil. She believes that the context of violence at home and on the streets lessens the impact of bullying at school. “In social interaction, in the construction of identity and autonomy, these actions will take place in an attempt to exclude what is different. If the school has a good climate, there are more effective limits preventing prejudice,” says Carolina. The higher prevalence of cyberbullying reported by private school students makes the professor assume that, in this environment, aesthetic



The study interviewed 436 students aged 9 to 18 from two private schools and four public schools, in the cities of Porto Alegre, Gramado and Viamão

PHOTO: PEDRO RIBAS/FOTOS PULCRAS

ment ool climate



PHOTO: GILSON OLIVEIRA

In private schools, students cited the exposure to cyberbullying more often

and consumption issues are taken into account more than other values. She estimates that the issue needs to be further developed, but she infers that the individualistic culture of the upper middle class also plays a role.

What it is

School climate refers to the quality of school life and is based on people's experiences in school, which involve rules, goals, values, interpersonal relationships, teaching and learning practices and institutional structures. Prior studies have associated negative school climate with learning disabilities, dropping out of school, substance abuse, contempt for school rules, symptoms of depression, low self-esteem and bullying.

Source: Psychologist Bruna Holst

Sample questions from the School Climate-Survey, which has 78 items*

IN THIS SCHOOL...

- Most students pay attention in class.
- Teachers treat students with respect, regardless of their skin color.
- The school's rules are fair.
- This school is safe.
- Teachers care about their students.
- Students are friendly to each other.
- Students are afraid of being bullied in this school.
- Teachers listen to their students when they have problems.
- Most students do their homework.
- Students like their teachers.
- Students are taught to care about the feelings of others.

* The options for response are "strongly disagree", "disagree", "agree" or "strongly agree."

Since the beginning of the school year, how often have the following situations been imposed on you by other students in this school?*

- Other students purposely left me out of their circles to make me feel bad.
- One student made others dislike me.
- One student said nasty things about me.
- In this school I was hit or kicked and it hurt.

* The options for response are: never, sometimes, once or twice a month, once a week, several times a week or everyday.



Foster research

Adriano Feil (L) and the crew research nanostructured materials



Technology can be used to build photovoltaic panels and touch screens.

Adriano Feil

PUCRS has had several calls approved by the National Council for Scientific and Technological Development (CNPq) in the Science without Borders program, in the Special Visiting Researcher (PVE) and Young Talent Scholarship (BJT) categories. Projects have been selected in the following fields: health, energy, natural resources and sustainability.

Adriano Feil, a professor at the School of Physics and in the Graduate Program in Materials Technology and Engineering

(Pgtema), is coordinating two studies, in both lines. In the PVE, he has the support of the National Renewable Energy Laboratory (NREL), which is located in the State of Colorado, USA, and is considered one of the most important in this area. The idea is to develop a thin-film system, characterized by a flexible material, which is transparent to solar radiation and electrically conductive for application in solar cell electrodes and photoelectrochemical H₂ production cells, activated by solar radiation. "This

material already exists, but it is somehow limited," Feil says. "What we propose is an alternative aiming at low-cost production and a plausible escalation process."

The commercial product commonly used nowadays consists of materials such as FTO, ITO and AVO – doped metal oxides. They are transparent to the visible solar spectrum and are electrical conductors, but the electrical conductivity is not the most suitable, the flexibility is limited and the production is costly. "We will go a different

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Projects approved by CNPq deal with health, energy, natural resources and sustainability

way, using metal nanowire structures. Nanowires are highly malleable, so it is possible to deform the material with no lack of electrical conductivity – production costs are lower as well,” he says.

The scope involves the production of nanostructured materials based on student Sandro Firmino’s doctoral project. He will be cooperating with the Brazilian visiting researcher who works at NREL, Alexandre

Mantovane Nardes, in the development of the transparent and conductive structure. The second part of the research will address the application of solar cells, by means of Leandro Gutierrez’s doctoral studies. “These two students are expected to go to the Laboratory, in the USA, with doctoral sandwich scholarships,” Feil affirms.

If the result is satisfactory, the technology may be of interest to companies

that want to reduce costs and produce in scale. It can be used in various forms such as in the construction of photovoltaic panels and touch screens, for example. Started in December 2014, the project is to be completed in three years and has an approximate budget of BRL 1 million, including also three post-doctoral scholarships, consumables for the laboratory and academic mobility expenses.

Diagnosis and treatment with nanoproducts

The project of pharmaceutical nanoproducts for nasal use has been selected for a PVE scholarship and will be carried out over a three-year period in partnership with Professor Marlise Araújo dos Santos, coordinator of the Joan Vernikos Aerospace Pharmacy Laboratory (School of Pharmacy), along with visiting researcher Yashwant Vishnupant Pathak, from the University of South Florida (USA). The goal is to develop nanoformulations for nasal use, which can be employed both in therapy and in diagnosis. The nasal method was chosen for the fact that it is not invasive, allows quick action and enables systemic action.

There are several parameters that must be observed when developing a formulation for nasal use before it is launched into the market. This project will include stages of preparation, physical and chemical analyses of the formulations and evaluations in nasal cell culture. “It is necessary to ensure that the formulations have mucoadhesive properties, are biocompatible and biodegradable, and generate neither

cilotoxicity nor cytotoxicity. Moreover, they should release the pharmaceutical over a period of up to 20 minutes, which corresponds to the amount of time that any product remains in the nasal cavity,” Marlise affirms.

Tests to assess what happens to the formulations in simulated microgravity and in regular environment are expected to be performed, since previous studies conducted by the group indicated that simulated microgravity increased the stability of the pharmaceutical formulations analyzed.

With a budget of about BRL 80,000, the project is supported by the Microgravity Center (MicroG) and the Multidisciplinary Center for Nanoscience and Micro-Nanotechnology (NanoPUC). Over the course of the research, Dr. Pathak will come to Brazil three times, staying for 30 days in each occasion. “By bringing together our expertise there will be opportunities for students and researchers exchange,” she says.

Marlise Araújo dos Santos will develop rapid-action nasal pharmaceuticals



Breaking the water molecule

In the BJT line, professor Adriano Feil leads the research for the development of a new conception of photoelectrodes that aim at capturing more efficient solar radiation, for the reaction of breaking the water molecule in order to produce H₂ and O₂ in a clean and renewable fashion. “The idea is to develop an alternative energy production process. We will make some semiconductor material immersed in water to absorb solar radiation and use such energy for the breaking of the H₂O molecule. Thus, we generate ultrapure H₂ and O₂ that can be used in applications in the energy production area and in the food, biomedical and chemical industry. The reaction is already known, the challenge is to produce an efficient and cost-competitive device,” he explains.

In the future, the potential application is to insert the ultrapure gases produced into fuel cells to generate electricity, and to this end, there can be no impurities in the process. “We will have H₂ and O₂. By doing such reform, we make water again. It is a closed cycle. Water turns into water again and becomes what feeds the system again, without adding carbon to nature,” he says.

This is a three-year long project, with a budget of about BRL 400,000, and has the participation of Brazilian post-doctoral researcher Pedro Migowski da Silva. He worked at the Institute of Technical and Macromolecular Chemistry, in Germany, and was interested in returning to PUCRS. “The exchange of knowledge

We will generate ultrapure H₂ and O₂ that can be used in applications in the energy production area and in the food, biomedical and chemical industry.

Adriano Feil

in both projects is essential. Our students will interact with professionals who are experts in their field and we will create an international collaboration network,” Feil says.

Diagnosis and treatment with nanoproducts

In the field of dental and orthopedic implants, Roberto Hübler, a professor at the School of Physics and coordinator of the Study Group on Surface and Interface Properties and the Materials and Nanoscience Laboratory, focuses his BJT-approved project on the manufacturing of different surface textures for metallic and ceramic materials, using an ultrafast laser system. “We will be working with titanium, which is the standard in implantology, as it is the best material to be applied to the

interface with the bone. The idea is to

modify the surface structure,” he explains.

Titanium surfaces will be morphologically, topographically, chemically and structurally characterized by different types of microscopy, such as optical, atomic force and confocal laser scanning, among other techniques. The idea is to assess the biological response in terms of wettability (amount of liquid that can be attached to the surface), resistance to harsh environments, cell adhesion, mineralization and bone integration.

The organism grows nuclei and fibers to then create a bone, using nutrients that are absorbed in the first layers. On a textured surface, it is possible to keep this

bone alive in close contact with the metal. As the textured titanium surface, at PUCRS, looks like fibrin monomer chains exactly as the bone begins to form, it is assumed that this bone attempts to imitate the structure, making the process faster. Thus, a dental implant that would take half a year to get fully recovered, as in the case of the titanium surface that is used nowadays, may take just a month, due to texturization. “The great hero in this case is the implant surface, which interacts with the bone

being formed, mimics the functions of the osteoblasts in the organism, and imitates the bone structure at the initial stage, which after growing, adheres firmly to this material,” Hübler explains.

Implants, pedicle screws, prostheses which replace spine vertebrae – whenever necessary to be attached to the bone; this surface is useful to accelerate the metabolism in relation to bone growth and a faster recovery. “There would be infinite possibilities for the future, such as adding a drug to the material in order to avoid rejection,” he says.

The advantage of using lasers to shape the metal is the possibility of making erosions in various shapes, on a nanometric scale, creating structures such as more mature or immature bones. The project, which had a BRL 30,000 budget, is being carried out in partnership with researcher Edson Costa Santos, from Senai-SC, where the activities involving laser will be performed, and with young talent Alexandre Cunha, a Master in Materials Technology and Engineering from PUCRS and Doctor from Instituto Superior Técnico – University of Lisbon (Portugal), who will be awarded a post-doctoral scholarship. “The symbiosis in this call allowed a cooperation project. We have the know-how in the biological side of it; they have the know-how in laser, therefore we both grew a lot. We are scientifically creating critical mass, forming knowledge, strengthening the research culture in the University,” Hübler concludes.

Roberto Hübler deals with the manufacture of various surface textures for titanium materials



Following Moriguchi

Geriatrics Symposium honors Professor Yukio Moriguchi

PHOTO: GILSON OLIVEIRA



PHOTO: ARCHIVE

With a standing ovation, in his valediction at the Institute of Geriatrics and Gerontology (IGG), Yukio Moriguchi bowed before the audience in the Theater of Building 40 at PUCRS and said:

– Thank you very, very, very much. That is all I can say. I did not expect this.

At 89 years of age, his lessons and his experiences regarding healthy aging permeated the 16th International Symposium on Geriatrics and Gerontology. What he dreamed about 45 years ago when he left Japan, introduced the first course on Geriatrics in Latin America at a School of Medicine (the one at PUCRS) and reinforced by creating IGG, in 1973, is realized through the mission of each professional he helped to train. As well as in the work of all those who seek the prevention of diseases and the well-being of the population.

During the tribute, the Director of the Institute, Newton Terra, emotionally highlighted the serenity, modesty and wisdom of the professor, and praised his vast contribution to the

country. On October 21, he received the title of Professor Emeritus of PUCRS.

Launched in the event, the book *Geriatría & Gerontología Preventivas*, from Edipucrs, by geriatricians Gislaine Bonardi and Emílio Moriguchi, is a practical manual for the promotion of healthy aging. It gathers the lessons of 50 years of practice of Yukio Moriguchi, who in 1988 was acknowledged as the main researcher in the field of primary prevention by the World Health Organization. This involves lifestyle (dietary, psychological, genetic, ecological aspects and physical activity), but the lesson goes deeper: “According to the experience and the years of study of Professor Moriguchi, a successful aging process is related to serving, collaborating, understanding, forgiving and loving.”

Gislaine talked to the professor once a week for six months, and had access to his teaching materials. She counted on the help of Emílio to translate the items from Japanese. “The book is a gift he gives to Brazil. It is a legacy for those who work with the elderly.”

At the symposium, Yukio Moriguchi presented a study conducted in the USA with ninety-thousand people that showed that those who went to church once a week had a lower risk of mortality from coronary disease (a reduction of 50%), emphysema (56%), liver cirrhosis

(75%) and suicide (53%). Spirituality today is seen by science as an integrating factor of personality and social inclusion. In his research in the state of Rio Grande do Sul, he has also observed the importance of physical exercise to prevent hypertension, heart attack, diabetes, obesity, stress, cancer, and Alzheimer’s.

Terra noted in his lecture that old age is not a synonym for disease, although people are more vulnerable due to organic changes. “One’s genetics accounts for 30%, and environment and lifestyle, 70%. The earlier the care, the better the results.” Terra also predicts advances in predictive geriatrics, such as carrying out genetic exams that may establish medical conduct. He notes, however, that it is necessary to discuss ethical issues, confidentiality and population access to these procedures.

PHOTOS: BRUNO TODESCHINI





Partnership in social me

Dell signs an agreement with Famecos to enhance customer relationships

Although telephone calls are still more commonly used for solving technical problems, Dell envisions many other possibilities to communicate with clients via social media. Since 2010, the company has invested in these platforms, and in August 2013, it began to release videos on its YouTube channel (Dell Suporte Brasil). But the team, led by mechanical engineer Alexandre Ew, was not satisfied with the result. Three months after signing the agreement with the School of Communication (Famecos), aiming at

enhancing its online actions, the interaction with consumers had tripled and the number of subscribers to the channel had increased by 50% per month. "The staff members are amazed. They did not expect so much appeal. The project has developed with the team and acquired a global dimension," Ew highlights. Materials are broadcast in five languages (Portuguese, French, Spanish, German, and Italian), and soon there will also be dubbings in Japanese, Korean, and Chinese. The team is based at the Science and Technology Park (Tecnopuc).

Every week a brand new video is uploaded. In general, they present technical details and tips for the best use of equipment. At least one is innovative in nature every month. They are usually recorded outside of the company studio, supported by Professor Aletéia Selonk, who coordinates the project at Famecos, with the participation of other professors and students. "Thinking about what you want to say, how and to whom affects the use of resources, language and aesthetics." In the beginning, we worked

with basic enhancements on Dell's team everyday production and their vision of the videos, and this already produced great results. From the evolution of the project and integration between the groups of the University and the company, improvements tend to increase by using the potential of the channels of communication with users," says Aletéia.

Dell offers scholarships to undergraduate and Master's degree students in the field of Communication. "For the students, it is very interesting to participate in the making of an audiovisual product that will be online the following week," says Aletéia. Professors Eduardo Wannmacher and Andreia Mallmann are part of the initiative. From this March on, trends on other social media such as Facebook and Twitter will be mapped.

This two-year partnership aims at exploring the potential of the Audiovisual Technology Center of Rio Grande do Sul (Tecna), which is being implemented at Tecnopuc in Viamão. Aletéia draws attention to the fact that the first Tecna project is not connected to a company from the creative field. "This shows that innovation and creativity are being pursued by several areas.



Videos present technical details and tips for the best use of equipment

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Videos present technical details and tips for the best use of equipment



Creative Garage

In January 2015, over ten groups were recruited to participate in Garagem Criativa (Creative Garage). For four months, there will be consulting, lectures, workshops and mentoring of professionals. The initiative comes from Tecna and Raiar Incubator. The resources come from the Department of Science, Innovation and Technological Development of Rio Grande do Sul state.

New scholarships

In January 2015, ten undergraduate students were recruited to work in projects linked with Tecna, aiming at understanding the audiovisual space in the context of Rio Grande do Sul state and structuring the Center. The scholarships are granted by Fapergs (Foundation for Research Support of the State of Rio Grande do Sul) and the research projects have PUCRS and Feevale as partners. In March 2015, seven Master's students will join it. From June to November, the Creative Business

Development Program, also with Feevale's collaboration, will select 40 students for technological scholarships. Their focus will be on the audiovisual and digital games fields, and scholarship holders will have the opportunity to develop pilots and models for businesses. "Regardless of whether they will have their own companies in the future or work for one, students can develop entrepreneurial skills. Having an idea is different from making it happen," states Professor Aletéia.

Tecna at work

The Audiovisual Technology Center of Rio Grande do Sul (Tecna) is being renovated in order to adapt its infrastructure at Tecnopuc, in Viamão. The renovation of the auditorium, on the 2nd floor of the

old Seminary, began in March 2015. It will result in the creation of the Laboratory of Cinema and TV. There are works currently in progress to build spaces for motion capture, animation, applications and digital games. Sound (for professional quality mixing) and data processing laboratories will also be constructed, as well as the permanent headquarters of Pré-Incubadora Criativa (*Creative Pre-Incubator*), a branch of Raiar (PUCRS Business Incubator), which houses Garagem Criativa (*Creative Garage*). These spaces should be ready

by July 2016, with specific and specialized equipment. "Tecna optimizes the logistics of production and lowers costs, increasing product quality. Companies will be able to rely on this infrastructure and have their headquarters in the Park," says Coordinator Aletéia Selonk.

Thinking about what you want to say, how and to whom interferes in the use of resources, language and aesthetics.

Aletéia Selonk





**Basement
of the Science
and Technology
Museum stores
3.5 million pieces
of scientific and
historical value**

*Lighting carefully installed not
to damage the fish collection*

Among relics and rarities

In the underground corridors of PUCRS Science and Technology Museum (MCT), locked doors enshrine collections that the public generally does not see. Behind each of them there are artifacts, rare fossils, specimens of fauna and flora, and more. There are 3.5 million pieces of historical and scientific value, that provide help for the research of academics and specialists from Brazil and other countries.

Pipelines on the ceiling, lighting carefully installed not to damage objects and noise restricted to the steps and few words of the staff members help to characterize

the basement. The place is for study and conservation. In all, 1,215 m² are dedicated to the 17 collections. Each of them has its respective adapted room.

There are approximately 2.5 million archaeological items and over 1 million fossils and specimens of fish, amphibians, reptiles, birds, mammals, mollusks, crustaceans, arachnids, myriapods, insects, plants, algae and protozoa. Not to mention the historical collection, which includes a technological array of equipment and utensils that have fallen into disuse, and the collection of minerals and rocks, present in smaller numbers.

Since the 1960s, the University has preserved materials obtained from collection expeditions, archaeological excavations, donations and exchanges with other institutions. "It is common, for example, for us to receive roadkill," says Professor Zilda de Lucena, Collections Coordinator.

The pieces were kept in the Museum's former smaller premises, previously located in building 10, where the School of Aeronautical Sciences is today. In 1993, the collections were transferred to an exclusive area in the current MCT site, where they remain.

Fossils millions of years old

Within all these collections, it is not difficult to find scientific relics, such as a complete skull of the semi-aquatic reptile choristodere. The animal lived in the Triassic period, approximately 230 million years ago, and is ecologically equivalent to the current crocodile. "The Museum is filled with rare fossils," says Professor Marco Brandalise.

Besides that, a tooth of dinocephalian, part of a group that belongs to the lineage of vertebrates that gave rise to mammals, is also a rarity. "This piece itself may be the only record that these animals inhabited South America," he states. Fragments of skeletons of rhynchosaurs, dicynodonts and mesosaurs can also be found, as well as specimens of megafauna, extinct for over a million years: giant ground sloths, ancient giant armadillos, mastodons and toxodons.

But not only the fossils are the gems of the Museum. Biological collections hold a number of endangered species. According to assistant Juliano Ramanzini, among approximately 450 thousand types of fish are, for example, the ariid catfish and the striped smooth-hound (collected mainly between 1959 and 1972). Among the birds, there are nests and eggs of yellow cardinal, common terns and birds rarely found in nature, such as the giant snipe, the tropeiro seedeater (recently described by science) and specimens of copper seedeaters.

In the amphibian collection, there is a small frog, *Elachistocleis erythrogaster*, which substantiated the description of the rare and endemic species found in 1998. In 2006, the *sapinho-verde-de-barriga-vermelha* (*Melanophryniscus admirabilis*) provided a model for characterizing the species, and this was the reason for the denial of license to install the Perau do Janeiro Hydroelectric Plant in Arvorezinha and Soledade (RS). An endangered species, these are animals restricted to a small area along the banks of Forqueta River, in the mentioned towns.



Giant ground sloth, extinct for over a million years



Jaw of a dicynodont

PHOTOS:BRUNOTODESCHINI



Handling of a cynodont fossil

Care and conservation

Managed by Professor Zilda de Lucena, curatorship activities begin as soon as each object or animal arrives at the Museum. "The process involves several steps. From screening of the materials to the verification of handling conditions," she explains. "Generally speaking, we identify the specimens, screen them, perform taxidermy (mounting of animals for exhibition or study), compile data in the computer, manage possible exchanges and care for their conservation," she says.

The collections are preserved in two ways: dried or immersed in fluids (usually, a 70% alcohol solution). The pieces which are preserved in fluids need periodical inspections, for alcohol may evaporate or even dry up. As for the dry preserved materials, these are packed with mothballs or camphor in environments with temperature averaging around 22 °C and 40 to 45% humidity in order to avoid the attack of insects and fungi. To handle objects, usually safety glasses, masks and gloves are worn. Cleanliness of sites and lighting are also controlled. "Dust and any incidence of light can cause damage to the collections," Zilda says.



Specimens on display

Some of the pieces of the scientific collections sometimes leave the basement to be displayed in the MCT. Archaeological objects are used in educational activities in the Museum, and even in elementary schools. However, for conservation purposes, most collections require physical and environmental conditions not found in exhibitions open to the general public. Exceptions may be made, as long as the items are made inaccessible to handling. "Fossils, for instance, are normally fragile and may suffer damage from handling, even by chemical reactions caused by contact with sweat from the hands," Brandalise states. "Because of this, depending on the way they will be displayed, it is common to use replicas," adds Zilda.

Curiosities

With so many specimens in the Museum, there are many stories to tell

What to expect from two ice blocks?

A collaborating biologist arrived at MCT with a huge frozen package on his hands. He said to the bird collection curator, Carla Fontana, without revealing its contents, that it was a surprise. "I was very curious and let it thaw," she tells us. From the ice blocks appeared birds with over 3 m wingspan, 1 m tall and about 10 kg each. These were two albatrosses found dead in Cidreira (RS). "One probably came from South Georgia Islands, an errant albatross, and the other, a royal albatross, from the Australian coast. These are rare specimen in RS and endangered worldwide."

A piece is never isolated in the world

A stone axe found in the city of Candelária (RS) has helped archaeologists to reconstruct occupation along the banks of Pardo River by past cultures. Even isolated from an archaeological context, the object, found 800 m from the waters, had marks from the use of Umu tradition – one of the first human cultures to explore the territory of Rio Grande do Sul state. "The tool must have traveled five kilometers from the place where it had been produced. This provides evidence that the overflowing of the river also brought materials made by human beings thousands of years ago," doctoral student Alexandre Matos tells us. The findings help to tell tales from the past. In the Museum's archaeological collection, one of the oldest objects comes from the Alto Uruguai region, where indigenous peoples made utensils 9,500 years ago.



The beauty of insects among the millions of items in the collection



Global to innovate

The concept behind new building at Tecnopuc is to connect people and get students involved

Innovation, creativity and networking. These are the concepts behind the new building of the Science and Technology Park: Global Tecnopuc, inaugurated on October 1. The place brings about a new ambiance, with colorful spaces meant to engage students, professors, administrative technicians and companies. "It is the first building in the Park that will not house companies," says Gabriela Ferreira, Dean of Innovation and Development for the Office of the Vice President for Research, Innovation and Development (Propeq).

Tecnopuc's administration office is located on the second floor. "Some of the organizations that are here will be chosen to be a part of Global Tecnopuc; the goal is, undoubtedly, to bring people closer," she states. The concept and structure were developed in partnership with HP, especially for CriaLab (Creativity Laboratory). "These are non-traditional spaces designed to connect people, open up new possibilities, and generate expansion; these things will happen as the building becomes occupied," she says. Additionally, there will be bicycle racks, dressing rooms and *chimarródromos* (places to drink

chimarrão) by the end of this year.

It will be a place for the inclusion of students. "The courses that already use the place to develop classes and workshops will be transferred here," says Gabriela. Companies will also be able to use the space for events, and thus, students and staff will have an opportunity to meet.

In the second week of October, Global Experience, a four-day event, dealt with its main guidelines: internationalization, creativity, networking and co-working. Topics to enhance this new experience were discussed in informal chats.

Besides a space for events, relationship-building and co-working, the goal is to attract students more strongly into Tecnopuc. "Today we have scholarship students and interns, but we want to have a greater circulation of any and all academic students," says Gabriela. Thus, besides CriaLab, there will be two classrooms in the building.

The goal is to bring courses, and especially, Project *Desafios* (Challenges), into Global Tecnopuc, adds the professor. One of the goals of the project is to encourage entrepreneurial attitude and

innovation. In the next semester, the course Challenges Project: Innovation and Social Impact will be launched. "We want this to lead students to stroll around the Park." The Office of the Vice President for Academic Affairs will manage the use of classrooms.

Since the goal is to allow the Campus and the city to reap benefits from the Park's operation, the Office of the Vice President for Academic Affairs will also have a space in Global Tecnopuc. Éder Henriqson, Dean of Undergraduate Studies, highlights that the focus of the University is the pervasiveness of entrepreneurship, bringing teaching and research closer to the companies and the innovation environment. "We deal with training toward an entrepreneurial attitude, aiming at bringing innovation to teaching, in order to meet the demands of society," Henriqson explains.

Networking will take place through lectures, talks and informal chats. "I imagine we will make more use of the lounge and the bean bag chairs than of the auditorium." The goal of the building is to promote a different mechanism for connection and relationship-building. The 250 m² lounge aims at co-working activities.

PHOTO: CAMILA CUNHA



Innovative project

Global Tecnopuc is a space of 4,000 m², with an architecture that resembles a construction toy, composed by two four-story towers, interconnected by a 300 m² bar. It received BRL 17 million in funds from Finep, PUCRS and HP. In its inauguration, President Joaquim Clotet has reinforced the importance of the undertaking. "This is an emblematic construction for the organized development in the society of knowledge, which should foster motivation and initiative, developing attitudes that contribute to citizenship and to the well-being of the community," he said. Tecnopuc currently houses 124 projects, gathering more than 6.500 people.



PUCRS creates Biobank and encourages research

PHOTO: PUCRS ARCHIVE



PUCRS was a pioneer in the creation of the Committee of Ethics in Research in Brazil, in 1990. Now, it is again ahead of its time with the establishment of the Biobank. The University was the first institution in Rio Grande do Sul to have such project approved by the National Committee for Ethics in Research (Conep). Cataloging the tissues, fluids and cells that are stored at the University will ensure protection to people who gave the material and will allow further research to be carried out with ensured ethical integrity. For example, teeth extracted during services at the School of Dentistry and tumors removed in surgeries at São Lucas Hospital will be filed by means of this system. Brazilian law prohibits the patenting and commercial use of these materials.

Complying with the Constitution, in the 1990s, the Ministry of Health regulated

the use of human biological material for transplants and treatment, as well as for research projects. Until 2011, human samples could only be collected and stored through immediate-execution research. That year, the resolution that established norms for biobanks was issued, allowing the assembly of collections, so that the material can be stored for future research. The Biobank is affiliated to the Office of Humanities and Research Ethics, of the Office of the Vice President for Research, Innovation and Development, and its establishment at PUCRS is being managed by Professor Clarice Alho, from the School of Biosciences, who says that this measure aims at ensuring the ethically correct use of materials.

The first suggestion for the establishment of the Biobank at PUCRS was given by Professor Antonio Carlos Araújo de Souza (from the Institute of Geriatrics and Gerontology), who passed away in the 2007 TAM Airlines accident. The work continued with Obstetrician Caio Coelho Marques, then Coordinator of CEP and affiliated to Conep. The proposal was submitted in 2013 and in the following year, with Clarice heading the process, there were reformulations. Later, the project was approved.

The human samples filed in the Biobank will be aimed exclusively at future research and will be under the responsibility of PUCRS, and will be derived from two

sources: materials stored in the University that are not tied to any ongoing research, and materials from the coordinated assembly of new collections. All samples will be mapped, identified, cataloged and kept in their places of origin and/or collection.

Loans to other institutions in joint research activities will be possible. Identification should ensure respect for confidentiality and data recovery of those who donated their material. Volunteers will be able to withdraw their consent at any time.

After the organization of the documents to be used, there will be identification of the existing items. The new collections will be formed based on instructions for collection, transportation, storage, use and destination of each sample. "A long-term project is to have an online piece of software for our researchers and those from other places to consult," says Clarice. Once established, the Biobank will encourage the proposition of new local studies and interinstitutional and international partnerships. In the future, when a research project is proposed, the organ, assisted by a specialized committee, will assess the availability of the items. It will be up to CEP to decide on the approval of the research project.

The Dean of Research of Propeq, Carla Bonan, says that the Biobank, "by storing and managing human biological material, following technical, ethical and operational standards, will become an important resource for biomedical research at PUCRS and the development of diagnostic and therapeutic studies and procedures of high quality, which is essential to scientific advance."

Learn the difference

- **Biobank:** organized set of samples of human biological material and associated data (identity of the patient, diagnosis of disease, features of interest to research, results of laboratory, biochemical and imaging tests). The institution is responsible for its management. It has no commercial purposes.
- **Biorepository:** organized collection of human biological material obtained through research projects, under responsibility of the institution and managed by researchers. The term for maintaining the items is ten years, but it is renewable. In this case, the items are not shared with other researchers of the subject. It has no commercial purposes.



Timeline

1988

The National Health Council (CNS) approves a resolution (the first by the organ) about research on human beings, aiming at establishing criteria of respect for their dignity and the protection of their rights and welfare. One of the norms refers to the fact that a research project is only allowed to happen when the knowledge sought cannot be obtained by other means.

1990

PUCRS founds the Committee of Ethics in Research, the first one in the country, according to the laws and regulations in force.

1996

The CNS approves regulations ruling research involving human beings. One of the new features is the creation of the Committee of Ethics in Research.

2011

The CNS approves guidelines for ethical analysis of projects involving storage of human biological material or use of material stored in previous research projects.

2012

The CNS updates the 1996 regulations ruling research involving human beings, indicating new features in the ethical analysis procedures through the CEP/Conep system.

2014

Conep approves the proposal for PUCRS' Biobank.

Samples with human biological material are being organized

The immortal cells

Henrietta Lacks, an American woman descendant from slaves, died of cancer in 1951, at 31 years of age.

Without her permission (which was not required at the time), in order to understand the disease, a doctor at Johns Hopkins Hospital, in Baltimore (USA), took a sample of cervical tumor for analysis. The cells were sent to the laboratory of a colleague of his, and this was the beginning of extensive research. These cells were later named HeLas, after the initials of the patient. What surprised the doctors was the fact the cells began to multiply. Even the polio and HPV (human papillomavirus) vaccines used this human lineage, considered the oldest. Cloning, genetic mapping and *in vitro* fertilization are other studies that have been successful based on this tool, in addition to diseases such as leukemia, influenza, hemophilia and herpes.

Without any of her children having received any compensation, the material was marketed throughout the 20th and 21st centuries. Being able to reproduce indefinitely, the cells are considered immortal if kept in good laboratory conditions, as they do not age. In order to tell this story, journalist Rebecca Skloot released a book in 2010, named *The Immortal Life of Henrietta Lacks*.

Source: Clarice Alho and <http://bit.ly/1dINOPd>

The cells of Henrietta Lacks's tumor initiated extensive research



PHOTO-REPRODUCTION

Source: CNS



Philosopher John Gray sees modern humanism as an alternative to religion and believes in human extinction in the long run

British philosopher John Gray, one of the lecturers of the 2015 Frontiers of Thought, is known for his criticism of modern secular humanism, and for predicting events such as the collapse of communism and the global financial crisis. Gray affirms that progress is an illusion in both ethic and political terms, and suggests that hope for a good life should not be based on the belief that mankind will be better. Having an extensive

academic career, he is an emeritus professor of the London School of Economics and Political Science. It was through his 2002 book *Straw Dogs* that he first gained the attention of society by defying the meaning of being human. The philosopher visited PUCRS, an institutional partner of the event, and addressed the extinction of mankind, the meaning of life, religion and awareness of death, among other topics, in an exclusive interview for PUCRS Magazine.

Does man ex

What does it mean to be human? Is it just another life form that inhabits the planet and will eventually be decimated?

Unless you take on some type of religious faith, humans are animals who can be distinguished from other animals in some aspects only. Unlike other animals, they may have the ability to develop knowledge, demand more power over the planet, be more destructive; however, if you have a naturalistic viewpoint on the human being and do not take on any type of religious faith, then, of course, they are animals and they will perish.

If mankind does not control its own destiny, then does it mean that the choices we make could not take us in different directions and lead us to different results? Would morality and immorality be irrelevant?

We are all going to die, but this does not mean that we do not have control over our lives. Humans may develop different traditions, have different lifestyles, make choices, do all types of things, despite the fact that they will perish. It is not because our lives end with death, both as individuals and as a species, that they are meaningless. They may be meaningful as long as they last.

If progress does not exist in terms of ethics and political logic, then what would be the meaning of accomplishments such as women's

suffrage, homosexual marriage, and having black persons and women as presidents?

These are genuine advances in civilization. When I say progress does not exist, I do not mean that these things do not happen, but that the things we achieve can be easily lost. The difference is that, in science, knowledge is not lost once achieved, whereas in ethics and politics, or in civilization, what we achieve is generally lost. If you had lived in Europe in 1913, you might have thought that the

accomplishments up to that moment were advances, but, after the First World War, many of these advances were lost.

What effects does the awareness of death have on the human being? Many people need to believe that there is something beyond this life. Would religion be the great pillar to fulfill this need?

The main difference between humans and other animals is the awareness of death. They do not know what death will bring any more than other animals, but they are aware that their lives are finite. Other animals do not have a self-image in which they see themselves threatened by death, they do not need to tell the story of their lives, they do not look back and think that life had meaning. The reason we look back is because we know that our lives will end. The need for myths, to create stories, is there because of the sense of mortality. The fundamental human issue is how to deal with death.

Do you believe in God?

I do not practice any religion and do not believe in God. I am an atheist in practice because I act on the assumption that this life is all there is. Many atheists replace God with mankind as a way to avoid death. They know they will die, that they will perish, but they think that, if mankind goes on and keeps reaching higher levels, in a way, they will also go

Mankind exists as a biological species, but in fact it is made up of billions and billions of individuals who will die and perish. (...) If you are that afraid of death, it is best to be religious. In this sense, you may be miraculously saved from extinction. If you feel that way, go to a church, go to a synagogue, go to a mosque.

Kind Kist?



PHOTOS: BRUNO TODTESCHINI



See more of John Gray's opinions in an exclusive video on the website www.pucrs.br/magazine

on. But mankind does not exist. It exists as a biological species, but, in fact, it is made up of billions and billions of individuals who will die and perish. Those who think they have freed themselves from religiousness invest their history and identity in mankind. That is an illusion to me. If you are that afraid of death, it is best to be religious. It is a more ancient and wiser tradition. In this sense, you may be miraculously saved from extinction. If you feel that way, go to a church, go to a synagogue, go to a mosque.

So religion and mankind would have the same role?

No. There are different types of humanism, but modern humanism, which emerged in Europe in the 18th century, is an alternative to religion, and this is the humanism that I criticize. French philosopher Auguste Comte spoke of the supreme being "Humanity". God is often referred to as the supreme being. He invented an artificial religion with its churches, where you idolize mankind and yourself, or the idea of self. I consider that a joke. If you want or need a religion, take one up, get into a church. Do not listen to critics, just join in one.

You said that you do not believe in God, but do you have a myth or belief?

I will give you an indirect answer. English writer P.G. Wodehouse was one of the great

comic writers of the 20th century; he lived to be nearly 90 years old. At the end of his life, he was interviewed by BBC and they asked him whether he had any religious belief. He answered that, honestly, it was difficult to say. That is also my answer.

How did you predict events such as the fall of communism and the disaster after Iraq? Would it be because human history is like a cycle, repeating and not evolving?

Yes, that is part of the reason. Another reason is that these projects have used the Greek source. In Western tradition, there are two main sources: one is biblical, Jewish and Christian, and the other, Greek. In Greek tradition, there is the idea of hubris, of acting without virtue, with arrogant pride. Certain projects are hubristic, meaning that they cannot be reached. When I predicted that the war in Iraq would be a disaster, I was not alone. Diplomats, military and intelligence officials affirmed that it could not work out. If you traveled to communist countries, you found almost zero popular support, no production of wealth, repression, a lot of censorship, religious persecution and a lot of damage caused to the environment. All that was needed to trigger the collapse was a series of defeats. In the War in Afghanistan (1979-1989), the Soviet Union lost – they were very cruel and savage after invading the country, but they lost. Then there was

“Women’s right to vote, homosexual marriage and black people and women as presidents are genuine advances in civilization. When I say progress does not exist, I do not mean that these things do not happen, but that the things we achieve can be easily lost. The difference is that, in science, knowledge is not lost once achieved, whereas in ethics and politics, or in civilization, what we achieve is generally lost.”

nationalism in the Baltic states (Estonia, Latvia and Lithuania were annexed to the Russian Empire in World War II, regaining their independence 50 years later), and religion in Poland (elections to Senate in 1989, after nearly half a century of communist dictatorship, which resulted in the fall of the government. Pope John Paul II, a Pole, had great influence in calling for elections). These are the reasons; because they were hubristic projects, and because human history follows in cycles.



Life requ ano

Philosopher
Gilles Lipovetsky
was conferred
the title of
Doctor Honoris
Causa by PUCRS



PHOTO: BRUNO TODDESCHINI

In a world characterized by excess, hyper-information, hyper-individualism and uncertainty, where everything gets out of control, French philosopher Gilles Lipovetsky says that life needs art. "We must provide youth with a taste for creation, sensitivity, and profound and spiritual novelty." In his new book *De la légèreté*, to be published in Brazil, he deals with the need for breathing, enjoying nature, meditating, reducing the frenetic pace of everyday life.

In his sixth visit to the School of Communication, Lipovetsky was the

main attraction of the 13th Seminar on Communication – *Windows to the World: Imaginary Screens*, which took place from November 17 to 19. He was conferred the title of Doctor Honoris Causa by PUCRS. He was commended by Professor Juremir Machado da Silva, who translated this interview given by the honored professor to PUCRS magazine.

Author of *La Culture-Monde: Réponse à une Société Désorientée* and *Esthétisation du Monde*, Lipovetsky challenges the saturation of the capitalist model, because "the power of the market is precisely to be able to permanently revive the desire". There is always a new movie, a new best-selling book. "Capitalism is like a wishing machine, always in motion. On the other hand, there is also a desire to make existence lighter."



Dilemma of future

For Gilles Lipovetsky, the refugees' situation has become a massive phenomenon, and raises the question of identity. He mentions the German Chancellor, Angela Merkel, who has adopted a generous policy toward immigrants, but is now starting to lose her popularity, even if the entry of foreigners may be a gift in a country with low birth rates. "When there is a lack of hope for the future, identity rises as

a protection mechanism. We defend what we are as a way to ensure we do not get lost." In contemporary times, the birth of a new society was expected, reflects the philosopher. "Not now. We are left clinging on to what we already have. All of this can be labeled as a dilemma of future, paradoxically, in the middle of the technological boom." Read on for more of Lipovetsky's opinions.

ires art lightness

What explains the current absence of leaders and lack of trust in institutions, besides the crisis of morals?

In the past, there were many charismatic leaders. We had Churchill in England, and Charles de Gaulle in France. Politics no longer has an appeal. Everywhere, politicians are losing popularity, and suffering with the suspicions of citizens. Brazil is a good example of this. There are several factors that explain this disillusionment: the end of great ideologies, or narratives, as Jean-François Lyotard has shown. Even after Stalin's crimes became public knowledge, communists throughout the world continued to believe in Marxism. Ideology was a strong means of illusion. Modernity was a promise of freedom, emancipation, of a different world. The second reason for disillusionment with politics comes from the media, which is no longer controlled by political parties, and plays a permanent informative role. The third factor is that we have never had so many educated people before. Even if mass education is deficient, people have become more informed and demanding. This alters the views on politics and makes it difficult for the existence of illusory and ideological propaganda.

How does mankind deal with accepting refugees?

There has always been room

for immigration. However, this time, we are dealing with a massive phenomenon. Far beyond the practical aspects such as nourishment and living conditions, there is a main issue, which is identity. The hyper-modern society is characterized by insecurity. The modern world has faced many wars, but people had the feeling that they controlled part of what they experienced. Today, they know that everything changes quickly. There is a logic of acceleration. The main references are lost, and among them, politics. Fewer differences

What of the future? Will it be acceleration or deceleration? Both. We will not stop consuming and wishing for novelty all the time, but we will also seek moments of lightness and resting.

exist between left and right. All of this creates a kind of disorientation. Consequently, a desperate desire to defend identity arises. Europe fears the loss of its identity, but it is aware that it carries obligations such as solidarity and fraternity. There is a lot of material progress, and little certainty of a guaranteed future. Life seems to get out of control.

Do you see signs of saturation of this model (life at a frenetic pace, excessive consumption)?

No. There are theoreticians who believe in the saturation of the capitalist model. The pace would be so frenetic that it would lead to the exhaustion of consumerist desire. The reality is different. There is no saturation. One movie supersedes another. One best-selling book replaces another. A trip to Guatemala creates the desire to travel elsewhere. The cycle is infinite. There is no limit. Only escalation. The power of the market is precisely to be able to permanently revive the desire. On the other hand, there is also a desire to make existence lighter. I deal with this on my book, which will be launched in Brazil shortly, *De la légèreté*. During their vacation, there are people who disconnect completely, switching off their cell phones and not using the Internet, going to quiet places. Others go days without using their cars. There is need for breathing, being in contact with nature, meditating, doing yoga, being zen, and stepping off the gas, reacting to this frenetic pace of everyday life. Facing excess and the hype, there is a need for lightness. However, these two movements coexist. What of the future? Will it be acceleration or deceleration? Both. We will not stop consuming and wishing for novelty all the time, but we will also seek moments of lightness and resting.



Brazilian and foreign students combine academic mobility and volunteering



Débora Kunz deals with children in a home for refugees in Germany

International experience and solidarity

Away from home since September 2014, Débora Kunz visits a home for refugees from different countries once a week. Monday evenings, from 7 to 9 pm, it is *Kinderbetreuung* time. She plays with children between 4 and 12 years old. She explains the activities in German. If someone does not understand it, another child usually translates what is said to their native language. "This work makes me feel better here and I realize that I am not the only one who is away from home. It is always possible to start over," she says.

Every year, undergraduate students from PUCRS travel during their academic training in search of

international experience, which later can make a difference in the labor market. Some mobility students go further, crossing the academic dimension and diving into different realities. In addition to clothes and objects, they take with them humanitarian feelings, solidarity, empathy, altruism, friendship, and care for others. They devote part of their time abroad to volunteering activities.

Débora attended the Mathematics Program (Bachelor's Degree) up to the 5th semester at PUCRS, and then went to Germany through the Science without Borders program. During the first six months, she took German

classes in the city of Marburg. Since March she has lived in Berlin and studied at Freie Universität, where she will stay until February 2016. "I really like children, I missed that interaction and did not feel too useful by just attending University. I wanted something that made me feel good. I have joined a group of international students, and in one of the meetings, I talked to a girl from California. She talked about volunteering and I asked for more information," she says. The activity is led by the Multitude institution. In Porto Alegre, Débora used to work as a volunteer at the Pastoral and Solidarity Center, leading a youth group.



Luciene Garay worked with children at the Portuguese Red Cross

A different and more optimistic world

At the Portuguese Red Cross, Luciene Garay worked with children in the play area: she used to blow up balloons and make drawings on the children's little hands and faces. She also collected food and money for the treatment of some little ones with cancer.

Graduated in Psychology, in January 2015, she attended the 7th semester at the University of Porto, between February and July 2013. Before going on the exchange, she looked to the Brazilian Red Cross for guidance about volunteering and how to work for the Portuguese Red Cross. Once she was there, she looked for the institution on her first week. "What encouraged me was the will to help people living outside my country and the desire

to be closer to a different culture," she says.

This was the first time that Luciene served as a volunteer, intending to devote herself to solidarity actions in the future. "The experience has been valuable not only for my education and résumé, but for my life. When I lived in Portugal, the country was in crisis (and it still is). However, even if the people were going through a difficult period, they donated what they had. This presented me a different and more optimistic world view. I have learned that it is always possible to do something to improve situations, however difficult they may be. When we do something with our heart, we get happier and more satisfied on our daily routine," she says.

Let's talk science?

Caroline Manto Chagas, a student of the School of Pharmacy, spent 18 months on an exchange through the Science without Borders program at Memorial University of Newfoundland, in St. John's (Canada). She arrived there in July 2013, and in the first semester she found a volunteering opportunity to work in Let's Talk Science. The program is present in about 3,500 universities, colleges and industries. It is an organization focused on education in youth development, which supports learning and new skills through science, technology, engineering and mathematics.

As a volunteer, she received training and took part in workshops on the development of creativity and pedagogy, and on methods of how to teach children in a fun and spontaneous way. "There are several science kits – among which some deal with marine biology, ancient machines, the human body, amusement parks, and the ecosystem – especially designed for children aged between 4-16 years. For each work, the volunteer gives a brief explanation about the activities that will be developed by the children. They have to draw, paint, guess, assemble, play, learn, help and have fun!" she describes.

Before going to Canada, Caroline was sent manuals of the University encouraging volunteering. "There this kind of experience adds value to your professional résumé, and even more so to your personal background. I have always enjoyed helping others, and I realized that I could do this while improving my English, learning new things about science and, especially, living and experimenting new cultures," she comments. In Brazil, she had visited almshouses and assisted in the preparation and delivery of soup to homeless people.

Caroline believes that such experience has enhanced her teaching degree, because she had never taught a "lesson" before. "Volunteering is valid and special in all areas. Whether with children or the elderly, in schools or on the streets, you feel like you make a difference in someone's day. It contributed to the learning of new social and professional skills, self-knowledge, exchange of experiences and the opportunity of seeing new places," she says. The 23-year old student graduated in August and intends to return to Canada for new studies.

Caroline Chagas in Canada: "learning new social and professional skills"





Innovation and development, two priorities at PUCRS

Innovation and development are two priorities at PUCRS. These words are now explicit in the strategic positioning of the University. It is not enough to teach and launch young talents in the job market. The University is expected today to be a protagonist in social changes, with its actions impacting on environmental, economic and cultural scopes.

Based on the knowledge generated by its researchers and guided by innovation that adds value, PUCRS contributes to improve people's quality of life, according to Jorge Audy, Vice President for Research, Innovation and Development. "The research field is essential as the foundation of this strategic positioning, creating a suitable environment for the transformation of the University itself and Porto Alegre, where the scientific and technological progress is quickly integrated in the lives of the city and its people," he highlights.

The Vice President for Academic Affairs, Márgda Cunha, says that the Institution has historically focused on innovation and development (I&D), "from the founding of a university hospital and a science museum to the creation of groundbreaking courses such as Aeronautical Sciences, for example, at a time when training pilots was not an activity for universities." The professor also mentions the relationship with companies, which generates development through research.

Changes in existing courses or the creation of undergraduate or graduate programs will take this approach into account. In terms of research, one of the changes was the reorganization of the structures into eight large theme fields (see box). This definition takes into account the challenges and demands of society. "To contribute in the search for solutions in these fields is our biggest

challenge in research and innovation," says Audy.

The Vice President for Extension and Community Affairs, Sergio Gusmão, believes that the growth of extension will reach an increasing number of beneficiaries in society. "The University of the 21st century must be a transformation agent of society. During its history, it has contributed to the empowerment of teaching, research and extension, supporting the growth of science, peoples and the communities involved."

Paulo Franco, former Vice President for Administration and Finance, adds, "Our role as a university of the 21st century goes beyond the noble mission of preparing people and generating knowledge. Today we also have the huge challenge of generating wealth and social, cultural and economic promotion in the environment we live in.

Concepts in everyday life

It is possible to perceive the concepts of innovation and development in practice in the Schools, as part of everyday life of students, professors and administrative technicians. In Computer Science, an example of this is project BEPiD that, in partnership with Instituto Eldorado (Eldorado Institute) and Apple, trains students in iOS technologies. The implementation in 2014 had great results: 87 students finished the course; over 70 applications were published on the App Store; 75% of students are still in the field; participants stood out in the Startup Garage and in the 8th Torneio Empreendedor (Entrepreneurial Tournament); two were awarded a scholarship in the Apple developers worldwide event (WWDC); and four companies were created.

Dean Fernando Dotti also mentions several research activities that have been carried out in partnership with companies, many located at the Science and Technology Park (Tecnopuc). "Computer Science students see in PUCRS an environment rich in opportunities, as they move continuously between learning and academic activities, opportunities to participate in research and innovation projects, internships or jobs,

besides undertaking entrepreneurial actions and following through with their ideas."

An initiative focused on the concept of I&D is the Software Experimental Agency, part of the recently created Software Engineering Degree Program. Students will be able to create prototypes and proofs of concept useful to society. According to Dotti, FACIN has also established a partnership with the company Huawei, aiming at creating a development environment for new applications for smart

cities, which allows the testing of innovations at real complex locations.

A practical example of I&D at the School of



Project with special reports was broadcast on RBS-TV to celebrate the anniversary of the Capital City

University stands out for a teaching style connected to prominent scientific research, offering solutions to transform society

From ideas to artificial intelligence

A precedent case search system that adapts to the attorney's profile, a prosthetic arm with hand and finger enhanced movements placed as a bracelet by those who have been amputated and shopping automation that enables self-service and ensures security for retailers. At least one of these ideas came to Wagner Lague, 31, Marcelo Pancinha, 25 and Patrick Bard, 20, in their first semester in the Information Systems Program, when they learned that PUCRS has the Raiar Business Incubator. They are now in the 7th semester, managing the company IA8, incubated at Raiar. The acronym stems from artificial intelligence, the base of their projects, and the number 8 came to complete the acronym, as it refers to infinity.

Patrick's trip to England through Science without Borders focused the group even further on this field. Previously incubated at Raiar, where they were 3rd place at Startup Garage, a business modeling program, the three have joined Bruno Silva, 25, a student of Computer Engineering. Their goal now is to join the incubator, get investment to develop the projects and launch their company. Their thoughts focus on technological improvements to make people's lives easier.

Wagner Lague (L), Marcelo Pancinha, Bruno Silva and Patrick Bard



Communication (Famecos) is *Projeto Ruas da Cidade* (Project City Streets), with special reports broadcasted on RBS-TV to celebrate the Capital City's anniversary. The idea came during Professors Silvio Barbizan and Fabio Canatta's Television Journalism IV course, aiming at revealing stories and uncovering characters of the city. For Dean João Guilherme Barone, the positioning "reflects daily actions of Famecos, especially in the sense of an opening towards the working world, social transformation, technological issues that alter the social structure and the economic activity through professionalism."

The professor highlights the innovation tradition. "The Advertising program is 50 years old and was the first in Brazil. It was at FAMECOS that the first Experimental Agency was created, and this resulted in Experience Space. The School also innovated by creating the Audiovisual Production Technology Program

(Teccine), creating laboratories for professional practices. Many of the new prominent audiovisual companies in the local market were incubated in these spaces." Among new actions, Barone mentions the curricular reform in the Journalism, Public Relations and Advertising programs, to be implemented in 2016.

In Medicine, curricular innovation is already a reality since 2014. Focus on internationalization and the permanent search for excellency in research, teaching and extension has also been highlighted by Dean Jefferson Braga da Silva. The incentive to academic mobility of students and professors and the launch of the Summer Courses in Surgical Specialties, General Surgery, Internal Medicine, Gynecology and Obstetrics and Pediatrics are among other initiatives related to I&D. "Educating doctors to be researchers sets the School of Medicine of PUCRS apart," he says.

Eight fields of research

- Environment and Biodiversity
- Materials, Processes and Equipment
- Energy and Natural Resources
- Biology and Health
- Humanities and Ethics
- Culture and Education
- Society and Development
- Information and Communication Technology



School of Aeronautical Sciences offers joint extension course with North American university



The institution is the most traditional one in the aviation field worldwide, with 20,000 students

International partnership

Éder Henriqson: "We have plans to expand this partnership and make it a specialization course"

The School of Aeronautical Sciences (Faca) offers the first blended learning extension course with the Embry-Riddle Aeronautical University (ERAU), from the USA, the most traditional aviation university in the world. *Human Factors in Aviation* is an interdisciplinary course and is of interest to different professionals such as pilots, psychologists, engineers and business administrators. It is the result of a partnership formed in 2013 between both institutions, which provides scientific cooperation in terms of academic mobility, research and education.

Security and human factors are sensitive and extremely important for high reliability organizations, such as the aviation case. Therefore, companies have strong administrative departments devoted to the management of this subject. In addition to a catastrophe with the loss of many lives, a security breach can affect the image of an airline. The human factor studies the human conditions in their working environment, and analyzes technological, organizational, individual and psychosocial factors that influence their performance.

Taught exclusively in English, the course will have a strong focus on human error investigation and prevention in all dimensions, with techniques of identification and classification of human failure, of management for the proposition of security countermeasures, of responsibility, and ethical and criminal discussion on how organizations should deal with pilots, mechanics and drivers who make errors.

According to the Coordinator, Professor Éder Henriqson, further opportunities are expected to arise for the creation of new courses in this modality,

taught by professors from PUCRS and ERAU. "We have plans to expand this partnership and make it a specialization course. We have projects under analysis in the human factors and security systems, business aviation and aeronautical communications areas," he says. Located in Florida, the American institution is considered the biggest one in aviation, with about 20,000 students and courses in related areas such as Engineering, Business and Psychology. "We proved that we are strong in the human factor and security areas. We want to further stimulate the intersection between both universities, with technical missions to take our students to 40- or 60-hour courses there," Henriqson plans.

There will be five modules, four of which will be taught by professors from the American University in the Embry-Riddle virtual environment, with texts, videos, case studies and lectures. The last module will be taught in the classroom, at PUCRS, by Henriqson. "The goal is to recover the contents taught online through practical activities in the classroom and create an experience exchange environment between participants, since we should have, as students, airline pilots and professionals from regulatory agencies, such as Anac, and from the Aeronautical Accidents Investigation and Prevention Center," says Henriqson.

The target audience includes professionals already working in aviation or in the security management and human factors areas. English proficiency is required. Further information can be found on the website: <http://erau.edu/brazil>.



PHOTO: PUCRS ARCHIVE



Taught exclusively in English, the course will have a strong focus on research and human error prevention in all dimensions.

Just English

Subjects taught in English are offered to students of the University



PHOTO: BRUNO TODESCHINI

Advertising Creativity II can be taken in both languages

Classes, readings, assignments, tests and songs. All in English, in the classroom. These are possibilities that PUCRS offers to its students. Foreigners can also attend the classes and fully understand what is taught. Since 2013, when some subjects began to be added to the curricula, more than 550 students took advantage of the classes to practice. And exchange students had the opportunity of attending classes taught in the universal language outside their countries.

Mateus Priebe, a student in the 4th semester of the Business Administration program of the Business School (Face), wished to practice and decided to take the subject *International Context and Economic Scenarios* in a group with eight other people. "I am really enjoying it," he says. He approves the initiative of the University to encourage internationalization. He believes that demand will increase and, with international students in the classroom, learning will be even better. Priebe says he had some difficulty in understanding specific terms, but with increasingly better language skills, he managed to take full advantage of the classes. And he gives a piece of advice to the professors: "I suggest more group tasks, so that the students can exchange information and practice conversation."

Professor Flavia Thiesen, Head of Academic Mobility, affirms that there are accounts in faculty meetings saying that student interaction is greater in classes

taught in English than in Portuguese. "It was a positive surprise," she admits. She recalls one student who, once, after leaving the class, during the break, had to pay extra attention not to place his order at the coffee shop in English unintentionally. "And he has never been abroad! He is improving his skills right here."

In the Advertising Degree Program, the *Advertising Creativity II* subject is taught in both languages, by Professors Marcel Viero and Marcio Blank. Viero explains that the contents and exercises are designed and prepared in the language used in class. "The world requires interconnected professionals, who speak and think in English. Everybody interacts and presents their opinions in a very nice way!" In the classes, the didactics and the extra examples used are the distinguishing features that the students enjoy more.

The idea of creating subjects in English came from the partnerships that PUCRS has with other universities, which also enabled the exchange of students who cannot speak Portuguese. This modality is common in Europe and in some countries of Asia.

When choosing a plan of studies at the Academic Mobility website, foreigners can choose the language of the class they will be attending, if this possibility exists. This year, Swedes and Germans showed interest in the subjects.

In the second semester of 2015, the possibilities were divided into blocks and not only into separate subjects, and there was a change in the timetables too. The topics have been transversal, from more advanced semesters, so that the students could learn more about the course. Students from other courses will also be able to take the subjects and have them counted as elective. Flavia believes that students will gradually lose their fear of the difficulties that they may have. "There is room to increase the availability, as there are scholars and professors willing to teach these classes," she concludes.

Availability for the second semester – 2015

Business School

- Corporate Strategy
- International Context and Economic Scenarios
- Information Management
- Project Management

School of Architecture and Urbanism

- Introduction to Sustainability

School of Communication

- Design in Motion
- Online Journalism
- Advertising Creativity

School of Law

- Philosophy of Law
- Criminology and Social Control
- Corporate Law II: Research and Practice

School of Engineering

- Renewable Energy

School of Humanities

- Natural Resources and Sustainable Development

School of Computer Science

- Fundamentals of Digital Entrepreneurship

School of Letters

- Language Acquisition Theories
- Creative Writing

School of Social Work

- Introduction to Social Rights and Policies



MicroG around the world

The Microgravity Center (MicroG), of the School of Engineering, is building a network around the world to foster and facilitate joint academic and research activities with other institutions dealing with space, aviation, and telehealth. The first step was creating MicroG Lisboa, in association with the Institute of Physiology of the University of Lisbon. It is led by Professor Isabel Rocha, and has the cooperation of professionals of Health, Veterinary Medicine and Biomedical Engineering. During the visit of Thais Russomano, Coordinator of MicroG/PUCRS, to the Portuguese capital, the first projects were planned in partnership, including virtual and classroom courses. Thais and Isabel also visited the Portuguese Air Force, which carries out academic actions along with the University of Lisbon.

Dom Leomar, the new pastor

The people of the city of Caxias do Sul, in the countryside of Rio Grande Sul, gathered in the late afternoon of March 25. In a ceremony held in the Diocesan Cathedral of his hometown, Leomar Antônio Brustolin, a Professor at PUCRS' School of Theology, was ordained bishop and became, officially, Dom Leomar. He had been appointed by Pope Francis in January for this new position in the Archdiocese of Porto Alegre. The Catholic community welcomed the new pastor with warmth and open arms – an expert in catechesis –, who will be actively present as auxiliary bishop next to Archbishop Dom Jaime Spengler. At 47, holding a degree in Theology from PUCRS, a Master's degree in Theology from the Jesuit School of Philosophy and Theology (Minas Gerais) and a Doctoral degree in Theology from the Pontifical University of Saint Thomas Aquinas (Italy), he has authored 28 books and launched projects that assist from children to the elderly in Caxias do Sul, where he was a priest for 22 years in the city's Cathedral.



PHOTO: PUBLICITY



PHOTO: PUCRS ARCHIVE

First university experience

Since April, PUCRS has been receiving students from 12 high schools of Porto Alegre for a three-month immersion experience. They are part of Pré-Grad, a program that until 2014 was exclusively linked to the School of Biosciences. This year the number of students was expanded to 50, and the amount of fields of knowledge also increased, now covering most of the undergraduate programs of the University. It has also become a project of the Office of Special Programs of the Office of the Vice President for Academic Affairs. The program ended in July. The activities of the University included visits to the Science and Technology Museum and the Pró-Mata Center for Research and Conservation of Nature, as well as participation in the Minute of Science and workshops proposed by the Schools in an interdisciplinary matter. Professor Raquel da Luz Dias was in charge of the coordination.

Patent in the USA



PHOTO: CAMILLA CUNHA

PUCRS was granted a new patent in the USA. It is about the Submerged Magnetic Biosphere device, an invention by Professor Paulo Franco (Vice President for Administration and Finance) and Researcher João Ernandes Vieira (photo), of the Institute of Electronics and Telecommunications of the University. The apparatus simulates the environment called deep space – a cosmos region out of the Earth's atmosphere and gravity, where gravitational and

electromagnetic effects are extremely low. Applications include the agricultural industry (in the strengthening and faster germination of grains and seeds), and nanobiotechnology, for use in pharmaceuticals, which enables lower dosage of drugs. Experiments with stem cells are also being carried out, but those are still at an early stage.

Connected class

They are among the 25 Brazilian professionals recognized by Apple in 2015! Professors Afonso Sales, from the Computer Science Degree Program, and Raquel da Luz Dias, from the Nutrition Degree Program, are now members of Apple Distinguished Educators (ADEs). This program is aimed at educators who transform their teaching and learning environment using Apple technologies. The community brings together more than two thousand professionals from around the world, who meet regularly to develop solutions aimed at education. This knowledge exchange also happens online.

More doctors

For the first time, the number of regular Doctoral students surpassed the number of Master's students in the Graduate Programs of PUCRS. During the first semester of 2015, there were 1,109 Doctoral students, and 1,096 Master's students. The programs with the highest number of enrolled students were Letters, with 83, Communication and Medicine (76), and Health Sciences (75). According to the Coordinator of Stricto Sensu Programs, of the Office of the Vice President for Academic Affairs, Eleani da Costa, the high level of quality and maturity achieved by the University programs, along with the growing demand for better skills, largely driven by the growth of the university system in general, are important reasons that contributed to such growth.

Smart City Innovation Center

The Smart City Innovation Center will be inaugurated in 2016 in Tecnopuc. This is a partnership between the School of Computer Science (Facin), the Business School (Face) and Huawei, a Chinese company that controls more than 15 subsidiaries in the field of telecommunications, with offices in Brasília, Curitiba, Manaus, Recife, Rio de Janeiro and São Paulo. The Center will focus on the development of solutions related to smart cities and the Internet of Things, with structure for testing and proofs of concepts that add value to the productive sector. Both PUCRS and Huawei teams dedicate their efforts to research and development of solutions, such as a system of smart street lights. The health and education areas are also part of the studies. In October, this initiative (supported by the Data Processing Company of the State of Rio Grande do Sul – Procergs and the Integrated Command Center of the City of Porto Alegre) was introduced to the scientific community, in São Paulo, by Fabiano Hessel, coordinator of the project and Computer Science Professor.



Best in the world

PUCRS is among the 800 best universities in the world, according to THE Rankings – Times Higher Education. The World University Rankings 2015-2016 evaluated institutions regarding their performance in education, research, knowledge transfer and the international scenario. Among Brazilian universities, PUCRS ranks 10th, while being the 2nd best private higher education institution, behind only PUC-Rio. The other institutions are public ones. In Latin America, PUCRS achieved the 21st place in the ranking.

A duke at Pró-Mata

Every year, the University of Tübingen brings Germans to Brazil. The Pró-Mata Center for Research and Conservation of Nature of PUCRS is always part of their plans. This year, the place welcomed a distinguished visitor, Wilhelm Herzog von Württemberg (on the left in the photo), a 20-year old German. He is a descendant of Prince Alexander Philipp Maximilian zu Wied-Neuwied, a naturalist who made a pioneering excursion into the south of Brazil between 1815 and 1817. Specimens of flora and fauna collected are still stored at Linden-Museum, in Stuttgart. The duke began his studies at Tübingen this year. If Germany were a monarchy, his grandfather would be the king of the State of Württemberg. For 25 years, he was the director of the association of friends of the University of Tübingen, a position occupied by Wilhelm's father today. The Germans were at Pró-Mata between March and April. The site receives 1,500 visitors annually, from 30 Brazilian and foreign institutions.



PHOTO: PUBLICITY

At Apple

Fifteen students of BEPiD, a course for training in the iOS platform – offered by PUCRS and Eldorado Institute, in partnership with Apple –, were selected to participate in a world conference with developers of iOS technologies. The Apple Worldwide Developers Conference took place in June, in San Francisco (USA). In addition to the traditional spots to developers at the conference, Apple gave 350 student-developers a chance to get a free ticket. To register, the applicants had to develop a curriculum-like application, adding all technology knowledge acquired during the course. The analysis of the best projects was performed by a committee of Apple.



Projects in Vila Fátima bring social benefits for people of all ages

Programming the future

The Vila Fátima University Extension Center, in the Bom Jesus neighborhood, in Porto Alegre, is a community health center, with doctors, nurses, and orderlies. As part of PUCRS, around one thousand undergraduate and graduate students from nine programs go there every year, to offer the community much more than basic care. The focus is on health care, but one can also envision and learn about a different future there. Two examples of projects that began in 2014 follow this path. One gathers participants of diabetes and hypertension groups in an attempt to generate income from handicrafts. The other sowed the seeds of computing in young residents of the neighborhood, in partnership with ThoughtWorks (TW), a multinational based in the Science and Technology Park (Tecnopuc). The goal was to show that there are real opportunities for them in this business.

The training, planned by the Office of the Vice President for Extension and Community Affairs (Proex), puts into action the idea of promoting joint projects with companies to benefit the poor. Several areas of the University and Tecnopuc were involved, and the facilities of the Vila Fátima Center were used. The pilot project comprised seven municipal school students from the last year of primary education, aged between 14 and 16, whose families are served in the Center. Module 1 includes basic

computing and programming contents taught twice a week by staff members of TW, with the help of scholarship holders of the Tutorial Education Program (PET) in Informatics. Once a week the young students came to PUCRS to attend English and Portuguese classes at the School of Letters, taught by PET students. They also had mathematics classes with scholarship holders of the Institutional Program of Teaching Initiation Scholarships (Pibid). They were supervised by professors.

“The interest of the participants was surprising, as well as the previous knowledge of some of them, who even had advanced programming classes,” says the educational coordinator of the Science and Technology Museum, Professor José Luis Ferraro, head of PUCRS’ Educational Axis and the one who negotiated with TW. The company gave scholarships worth BRL 350 to every student during the two-month course and donated to PUCRS the laptops that would be used in the classes. The University was in charge of providing the students with transportation.

Four staff members put their tasks at TW aside to go to Vila Fátima. In addition to them, others worked in the preparation of materials and the management. “It was amazing. After a month and a half they were programming – and they have not even finished elementary school yet. The contents are part of the curriculum,” says Hugo Vieira, 32, one of the course

teachers. At the beginning, the classes addressed the basics, but soon expanded and students even created a mini-game. The challenge for Gabriel Pereira, 27, also from TW, was to learn how to teach a class.

Pereira, software development consultant, and Marta Saft, one of the sponsors of the project, point out that the company believes in the power of technology as a social change tool. “Above all, the idea is to allow new doors to be opened for them by introducing technology in their lives,” says Pereira. The company offers similar projects in the world (this is the first in Brazil) focused on computing education. TW wishes to invest in new editions of the project this year, but to do so, they are seeking for partnerships with other companies in the same field.

Hélio Souza Fuques Filho, an 18-year old student currently in the 1st semester of the Computer Engineering program, participated in PET Informatics. “I like teaching, and I have also learned a lot.” Will he become a teacher some day? “That is an idea to consider,” he says. “The contents are challenging for us and for them, but when we understand the logic behind computing, it becomes something totally new.”

The Mathematics classes in Vila Fátima started at 3:30 pm, but at least ten minutes before that the young students were already there solving problems.



Seeds of computing: PUCRS and ThoughtWorks have trained seven municipal school students between 14 and 16 years of age whose families are aided in Vila Fátima

Guilherme Betto, 31, an undergraduate student and Pibid scholarship holder, says that they managed to make impressive progress in just a few classes. He believes that one of the reasons for that is the possibility of individual understanding. "Here they express doubts that they would not bring up in class." Guilherme used to be an accountant, but gave up his profession and nowadays deals with numbers in a different way.

By erring, one can be closer to the right answers. Both in Mathematics and in a foreign language. Hully Chedieck da Rocha, a 21-year old student currently in the 6th semester of the English Language Teaching Degree Program and a PET scholarship holder, says that the work was rewarding. "By the time I would start the English class, they were on their way or already waiting in the hallway. It does not seem much, but it is surprising if you consider that in regular schools students will not get into the classrooms, even if the bell has already rung." She says that they were well responsive, smart, studious and participatory. "I think our greatest challenge was to show that English classes are not only about memorizing verbs and translating texts; they mean understanding what you wish to speak and make yourself understood." The contents were planned under the supervision of the Tutor of PET-Letras, Professor Silvana Silveira, and focused on covering computer-related vocabulary.

Educational Hub supports educational activities

The hub is installed at the Science and Technology Museum (MCT) and is in charge of all PUCRS educational activities connected with other institutions. Vacation at the Museum, A Night at the Museum, and the Science and Innovation Fair are some of the projects created by the team coordinated by Professor José Luís Ferraro.

Practical classes of Marist schools carried out at the MCT are also supported by the Hub. PUCRS prospective teachers enrolled in the Methodology of Education

subject or undertaking a supervised internship can take students there for an out-of-class activity. Everybody gets free tickets. "This initiative aims at enhancing the education of PUCRS students and encourage them to transcend the boundaries of traditional classrooms," he says. Activities at the Museum help PET participants and Pibid scholarship holders. The Educational Hub coordinates the School-Science Program (Proesc), which provides free admission at the Museum for public school students.

Requirements for taking part in the program

- Residing in Bom Jesus neighborhood
- Being about to finish primary education
- Having interest in learning about computers

About TW

Present in 12 countries and having 2.5 thousand employees, the company is defined as "a community of passionate people aiming at revolutionizing software design and creation, while advocating a positive social change."



Concerts in the Community project makes its debut

The training of young people sponsored by TW/PUCRS had a graduation ceremony, with the debut of the project *Concerts in the Community*, which belongs to the Institute of Culture. The Philharmonic Orchestra and the Choir performed at the Bom Jesus Cultural and Sports Center, in the neighborhood where the University promotes several activities aimed at the local community. Orchestral versions of popular songs were performed.

Led by conductor Márcio Buzatto and with the participation of soloist Hevelyn Costa, the event was sponsored by Rossi and the Lojas Renner Institute, and was partly funded by the University. The Municipal Government of Porto Alegre supplied chairs and the Military Police was responsible for security.

Director Flavio Kiefer stresses that the Institute of Culture plans to present other Concerts in the Community this

year, mainly on special occasions. Another initiative under consideration is the Didactic Concerts, in which the primary objective is to encourage and spread the musical culture among children, familiarizing them with an orchestra and with the language of classical music. Presentations are planned to happen at PUCRS theater for public and private schools of Porto Alegre. The Institute of Culture is seeking sponsorship for the project.

The Philharmonic Orchestra and the Choir performed under the baton of Márcio Buzatto



Services in Vila Fátima

- **Programs:** Medicine, Physiotherapy, Nutrition, Dentistry, Pharmacy, Social Work, Psychology, Law, and Pedagogy
- **Areas:** social aid and development, law, education, and health
- **Number of individual services/year:** 33 thousand
- **Interventions in home visits of the Program of Integral Assistance for Bedridden Patients/year:** 1.1 thousand





Entrepreneurial training and social impact

Éder Henriqson, Dean of Undergraduate Studies

In developed countries, we can notice downsizing in great corporations, as well as a stronger competition for jobs and an increase in the number of small companies and self-employed professionals. Additionally, there is a clear trend toward lifestyles and activities that value simplicity, freedom, pleasure and self-fulfillment. In these countries, it is understood that entrepreneuring also generates social impact and entrepreneurial training is possible and necessary.

Recent studies highlight the role of Higher Education Institutions in this process and how the environment – more than the courses themselves – is responsible for generating favorable conditions to entrepreneurship. Thus, entrepreneurial training demands an ecosystem of teaching, research, innovation and extension that is interdisciplinarily oriented toward practical experimentation, collaborative work and support for the future entrepreneur. PUCRS already has this ecosystem, and at present we see fit to intensify the connection of graduate education to all that. This is a strategic possibility to stress entrepreneurial training as an important hallmark of our teaching and the entrepreneurial attitude as a distinctive feature of our scholars.

Entrepreneuring does not mean only starting a company or a new business. This concept is found in many books and manuals, but that may limit a more important and broader understanding on it. Entrepreneuring may be explained as building and taking advantage of conditions that enable to connect individual, collective or organizational skills with

the needs of society, whether economic, social or cultural. It can be thought of as an experimental exercise that does not need to be articulated only to a logic of consumption, and that demands ethical commitment, creativity, systemic vision, leadership and problem-solving skills, as well as resilience and perseverance.

The classroom may be the starting point for innovation and entrepreneurship at PUCRS, which also has a wide scope of

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Entrepreneurship is fundamentally an exercise of autonomy and sovereignty that projects us (or should) beyond the logic of imitation, invention, reproduction of imported technologies, research piled up on shelves, and teaching that treats students as a repository of knowledge and prefabricated repertoires.

initiatives and facilities to support research, training entrepreneurs, creating new business lines, pre-incubating, incubating, accelerating and developing companies that are innovative in nature and committed to relevant issues in society.

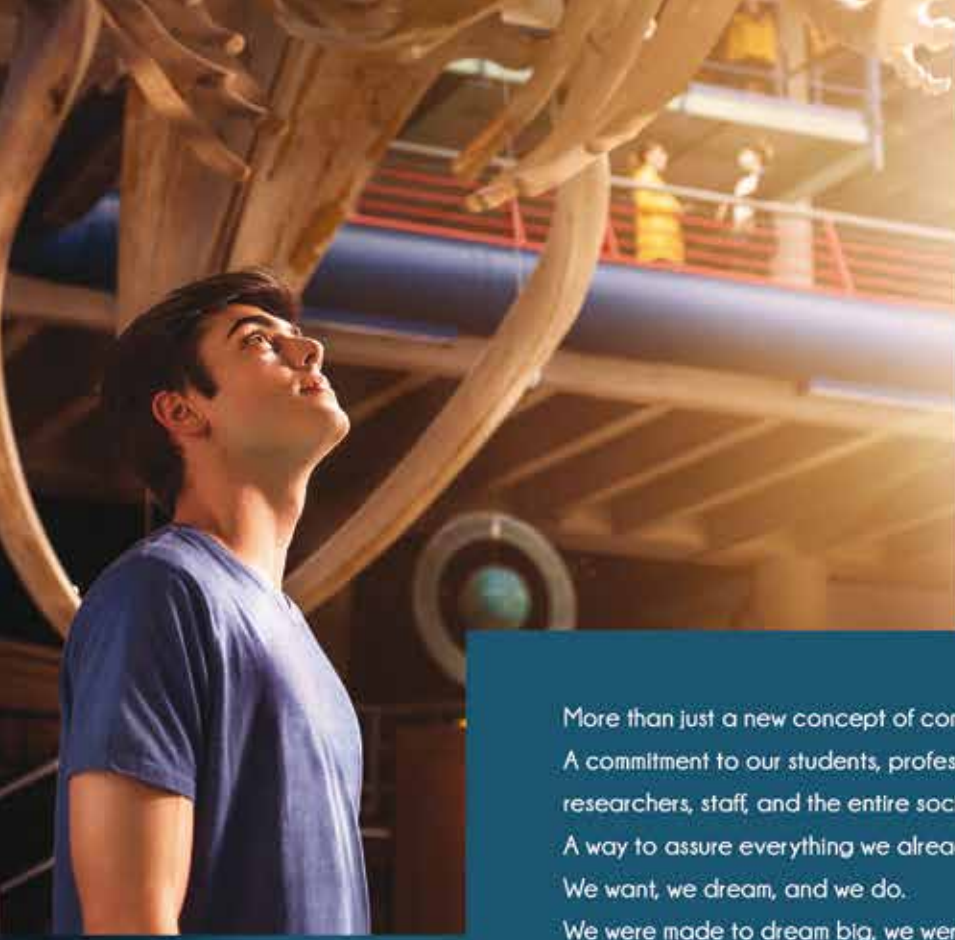
To illustrate this, in numbers, we can mention over a thousand research projects developed in over one hundred laboratories and 400 research groups. Graduation alone is provided with approximately 700 scientific undergraduate scholarships, many of which are funded by the University's own resources. We can also highlight the

Entrepreneurial Nucleus, the Creativity and Entrepreneurship Laboratory (CriaLab – part of Microsoft-PUCRS Innovation Center), the Innovation Management Support Nucleus, Start Up Garage, the Raiar Business Incubator, the Technology Management Agency, the Enterprise Management Agency, the Innovation and Entrepreneurship Network (Inovapucrs), the Science and Technology Park (Tecnopuc), among so many other initiatives. It is also noteworthy that PUCRS today also trains companies, many of which are installed at Tecnopuc.

Initiatives such as the constitution of an entrepreneurship hub centrally located on Campus and the development of teaching projects proposing challenges focused on real issues are designed aiming at enhancing and fostering greater interdisciplinarity in relation to the theme of entrepreneurship in the University, transforming promotion actions into entrepreneurial training.

Entrepreneurship is fundamentally an exercise of autonomy and sovereignty that projects us (or should project us) beyond the logic of imitation, invention, reproduction of imported technologies, research piled up on shelves, and teaching that treats students as a repository of knowledge and prefabricated repertoires.

Entrepreneurial training may be stimulated as an alternative to simply “training for jobs” and presumes calling professors and students to experience creativity, to commit to social impact, to have the courage to take risks, and to stimulate innovation and autonomy of actors in the educational process.



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