NEW TRENDS IN ASTRONOMY TEACHING pdf

1: New trends in cosmetic technology - Education Programme - in-cosmetics Global

These are just some of the timely questions addressed in this stimulating review of new trends in the teaching of astronomy. Based on an international meeting hosted by the University of London and the Open University (IAU Colloquium), this volume presents articles by experts from around the world.

March 3rd, The pace of change is mandating that we produce a faster, smarter, better grade of human being. Current systems are preventing that from happening. Future education system will be unleashed with the advent of a standardized rapid courseware-builder and a single point global distribution system. Introduction â€” Within two years a radical shift will begin to occur in the world of education. While many people are making predictions about the direction that education systems are headed, we have found the best predictors to be hidden in the participative viral systems springing to life in the online world, such as iTunes and Amazon. These bottom-up approaches are quick to develop, participant-driven systems that are closely aligned to the demands of the marketplace. In this paper we will focus on the key missing elements that will cause the disruptive next generation education systems to emerge. These missing pieces will likely be created within the next two years through private funding and will cause a dramatic educational shift in less than five years. The primary missing pieces are a standard architecture for an organic courseware module and the software necessary to build this courseware. The solution to these missing pieces will be a participative courseware-builder that allows the general public to create courses on any conceivable topic. We expect many companies will attempt to solve this problem, but the market will quickly gravitate towards the one it likes best. Once the market begins to gravitate towards a favorite courseware-builder, a number of new systems will be developed to grow the courseware library, build integrity, make it universally distributed, archive results, and add functionality. Lessons from the Ancient World During the time of the ancient Greek civilization, several mathematicians became famous for their work. People like Archimedes, Pythagoras, Euclid, Hipparchus, Posidonius and Ptolemy all brought new elements of thinking to society, furthering the field of math, building on the earlier work of Babylonian and Egyptian mathematicians. A few generations later the Romans became the dominant society on earth, and the one aspect of Roman society that was remarkably absent was the lack of Roman mathematicians. Rest assured, the scholarly members of Roman society came from a good gene pool and they were every bit as gifted and talented as the Greeks. But Roman society was being held hostage by its own systems. One of the primary culprits for the lack of Roman mathematicians was their numbering system â€” Roman numerals and its lack of numeric positioning. But the feature that made Roman numerals so bad was the fact that each number lacked specific numeric positioning and was in fact an equation, and this extra layer of complexity prevented people from doing higher math. Roman numerals were a system problem, and a huge one at that. They prevented an entire civilization from furthering the field of math and science. Romans were so immersed in their numbering system that they had no clue that it was preventing them from doing even rudimentary math such as adding a column of numbers or simple multiplication or division, a feat still handled by abacus. It also prevented them from creating some of the more sophisticated banking and accounting systems and restricted academia from moving forward in areas of science, astronomy, and medicine. Ratchet forward to today. We live in a society where virtually everything is different from the days of the Roman Empire. But what seems so counterintuitive to most is that we are even more dependent today on our systems than the Romans ever were. Most of these systems we take for granted â€” systems for weights and measurement, accounting, banking, procurement, traffic management, and food labeling. With each of these systems we are much like the Romans, immersed in the use of these systems to a point where we seldom step back and question the reasoning and logic behind them. Our systems govern virtually every aspect of our lives. They determine how we live and where we live, what we eat and where we work, where and when we travel, how much money we will make, the job we do, the friends we have, who we marry, and even how long we will live. But much like fish not understanding what water is, we seldom step back to fully understand the context of our existence. Our systems are what control the flow of commerce, govern our effectiveness as

members of society, and create much of the stress we face on a daily basis. The upside is huge. So what are some examples of restrictive systems that are preventing us from doing great things? Here are just a few examples: Income Tax System â€” The income tax system is currently the mother of all boat anchors, slowing commerce and the pace of business to a crawl. Half-Implemented Metric System â€” We are using a half-implemented metric system where we are purchasing cars with 3. Keyboards â€” We use keyboards that were designed to slow the speed of typing by placing the most frequently used keys randomly across the face of the keyboard. Keyboards in any configuration are an extremely inefficient way to transfer knowledge from one person to another. Laws â€” We now have more laws on the books in the United States than any country at any time in history. With each city, county, state, federal agency, and taxing district able to issue their own regulations, mandates, ordinances, rules, and law, we have created a legal snake pit of intertwined and overlapping rules that we are expected to live by. Lest you think the United States is the only country with system problems, consider some of the major issues plaguing other countries: Chinese Alphabet â€” The number of Chinese characters contained in the Kangxi dictionary is approximately 47,, although a large number of these are rarely-used variants accumulated throughout history. Studies carried out in China have shown that full literacy requires knowledge of between three and four thousand characters. So as you can see, we are a long way from optimizing the systems that govern our lives. The freedom that we value so highly in the United States is only a fraction of what it can be if we begin to seriously reinvent society one system at a time. And the system that we see as the highest leverage point for improving society is our education system. Eight Driving Forces â€” The following are eight key trends that are driving change in the world of education. These trends will eventually define the size, scope, and speed of the emerging new system along with the characteristics needed for a global-scale adoption. As you read through the following trends, it is our hope that you will begin to feel the forces at play, gain a sense of the undercurrent of influencers, and begin to understand the dramatic changes that will be happening only a few short years ahead. Transition from Teaching to Learning Education has traditionally consisted of the two fundamental elements of teaching and learning, with a heavy emphasis on teaching. Throughout history, the transfer of information from the teacher to the learner has been done on a person-to-person basis. A teacher stands in front of a room and imparts the information for a student to learn. A teacher-dependent education system is also time-dependent, location-dependent, and situation-dependent. The teachers act as a control valve, turning on or off the flow of information. The education system of the future will undergo a transition from a heavy emphasis on teaching to a heavy emphasis on learning. Experts will create the courseware and the students will learn anytime or anywhere at a pace that is comfortable for them, learning about topics that they are interested in. In the future, teachers will transition from topic experts to a role in which they act more as guides and coaches. Exponential Growth of Information During the time of Gutenberg, people tended to live and die within 20 miles of where they were born, not because they were afraid to travel, but because they had no reliable maps. People during this era had a very limited understanding of the world around them. The flow of information was controlled by just a few elite members of society, and they understood well the concept of knowledge equaling power. We have gone from that time, just years ago, where information was precious and few, to today, a time where information is so plentiful that we feel like we are drowning in it â€” information overload. Elite members of society still control the flow of information, perpetuating the notion that only doctors can understand medicine, only physicists can understand how the universe works, and only teachers know how to prepare us for the world to come. There are many ways to talk about the rapid growth of information that we have experienced over the past few years. But it is important to pay attention to the changing dimensions of information as well as the sheer volume of it. Information is no longer just text-based, but graphical, musical, audio and visual. Consider the following statistics The number of songs available on iTunes â€” over 3. The number of books on Amazon â€” over 4 million. The number of blogs available online â€” over 60 million. The number of entries on Wikipedia â€” over 4 million. Courseware Vacuum After viewing the data above and thinking about the size and shape of information around the world, now consider the number of courses available, either online or in a classroom. Information

is exploding around us in every possible form. Yet, we do not have an easy way to translate these blocks of information into courseware. While some attempts are currently being made to unleash the public on this problem, we remain a long ways from solving the problem. Open Education Movement â€" The open-education movement was inspired by the open-source software movement i. It mixes in the powerful communication abilities of the Internet and applies the result to teaching and learning materials, such as course notes and textbooks. Open educational materials include text, images, audio, video, interactive simulations, and games that are free to be used and also re-used in new ways by anyone around the world. It is estimated that more than well-intentioned initiatives have been launched in this area. Some open-education projects are already attracting a large number of users per month. MIT now claims 1. Connexions claims more than one million people from countries are tapping into its 3, modules and courses developed by a worldwide community of authors. Wikiversity is a division of Wikipedia serving as a community for the creation and use of free learning materials and activities. Wikiversity is a multidimensional social organization dedicated to learning, teaching, research and service. Its primary goals are to create and host free content, multimedia learning materials, resources, and curricula for all age groups in all languages. Moodle is a course management system using a free, Open Source software package designed to help educators create effective online learning communities. Moodle claims over 20, participating sites listing over , courses. While we applaud these efforts, there are some critical elements missing. The learning system of the future will have a single access point for all of its courses. Moodle is claiming over , courses but they are spread over 20, sites and many courses are duplicates. We estimate the number of unique and different courses to be less than 50,, not in the millions like the number of available books and songs. Using books as a close analogy, it can be argued that every available book has the potential of being translated into courseware and, most often, multiple courses. There are currently far more topics discussed in books than there are courses to teach the material. This leaves an obvious courseware vacuum waiting to be filled, and the key to unlocking this vacuum is the participative courseware-builder described below. The primary driver behind this ever-expanding dimension of vocabulary is the ongoing development of science and technology. Along with the creation of new science and technology comes the need to explain its attributes, its function in technical terms, and its overall purpose. New words and their associated colloquialisms help create meaning and structure around the emerging new concepts as they attract more research and come into focus. Young students can learn new words quickly: This, of course varies significantly from one student to the next. In the English language, the 2, most frequently used words account for percent of the words used in non-specialized written texts and about percent in conversational speech.

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2: 6 exciting education trends for

For astronomy, there are many opportunities represented by virtual reality, online courses, and blended education. Informal education establishes a healthy and creative environment for students going through the process in a personalized and acknowledging fashion.

By design, the role of an educator is to examine current states both within the classroom and within the world and find ways to adjust and pivot depending on what is in the best interest of students and learning. Perhaps more than any year in recent past, incited many questions and unknowns for teachers â€" leaving room for much uncertainty, but also offering great opportunity for exploration and growth. The first weeks of our new year have provided good space and time for reflection. Many teachers found themselves asking: Following in the participatory learning model in education, a major trend we saw ignite and begin to take shape in , many teachers started the year by joining in the oneword project. Some words called for action; others revealed moonshot aspirations that dreamed to make the impossible possible. But, all brought foresight and anticipation for a year full of hope and progress. In education over the past several years, the groundwork has been laid. We are now in a time when areas such as inquiry, equity, and voice and choice of students are guiding practice and pedagogy. This year, we are set to see both refinement and reinvention as it is a time where pathways to even moonshot dreams are attainable. Social emotional learning, social justice, access and opportunity will extend into every grade and every content area, and students will be invited to learn in their own ways through learning that is project based and centered on sustainable growth. As we look to make the best it can be in education, here are six education trends to watch in the year ahead: Students as critical consumers and content creators Now more than ever, our students need to be equipped with the skills needed to be careful evaluators of information. This year we can expect increased emphasis in both instruction and assessment on areas of digital literacy, media literacy, and civic education. Students will be asked to critically evaluate information and sources and discover the importance of high quality, relevant content. This year, we will see this expanded past classroom walls for more emphasis on community outreach and blended learning. Mobile learning will be enhanced with more interactions in online discussion forums and interactive multimedia experiences. The concept of anywhere, anytime learning will gain increased focus as asynchronous course work will be integrated more fluidly with in-class instruction, and students will have more opportunities for making real-world connections with learning through outreach, community connections, and global collaborations. Formative assessment to support learning and inform instruction As teachers aim for explicit outcomes, they will find strategic ways to incorporate formative assessment into learning experiences. Feedback systems and self-assessments will be used to inform instruction and assist students in better understanding learning goals throughout the entire process. Formative assessment in instruction will also be paired with emphasis on intrinsic motivation with shifts from focus on grades to focus on learning and also with differentiation with dedication to mastery for all. Participatory learning for teachers The movement of prioritising voice and choice in education this year will be extended from students to also include teachers. Participatory learning opportunities will become more prevalent and also more prioritised. Collaborative models, such as Edcamps and Twitter Chats, will begin to disrupt traditional professional development structures and teachers will be empowered to customize learning and professional growth based on interests and learning goals. Microcredentialing, digital badging, and Open Educational Resources OERs will take center stage, and dedicated PD will become accessible to all as opposed to a select few. Requests from teachers for actionable, engaging, and reliable PD will be heard, and teachers will be invited to use backward design planning to map out their desired end goals and the pathways they want to take to get there. Teacher delight will become a much-needed area of focus as schools and administrators will look to improve the teacher experience and reinvent teacher identity. Teacher work spaces modeled after startup culture designs will become more collaborative, functional, and supportive, and teachers will be empowered to share perspectives and opinions in design thinking-style faculty meetings. Innovative and collaborative technologies will be used to connect and celebrate teachers, and opportunities for reflection and discussion will be prioritised. Teacher leadership

will continue to gain traction and communities will dedicate resources to highlighting and valuing educators as heroes. Parent as partnersâ€¦ Really! The involvement of parents in the success of a student is undeniable. In , schools will work to find ways to engage all families through supportive and personalized technologies and practices. Schools will concentrate on building home school connections for learning, and they will include parents as partners through surveys, parent interviews, and invitations to join as valued contributors. Advanced technologies will support parent engagement through visual workflow applications, and learning management systems will be further developed and emphasised to promote parent participation. This year educators will involve parents early and often, and as partners, we will work together to best support our students as a community. In , we as educators have important work to do. We as a global network have the ability to individually and collectively be the change we so desire to see. Through thoughtful and intentional dedication to bringing focus to the good happening in our classrooms and to amplifying our voices as teachers, we can make forward progress to supporting all students in learning.

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3: 4 more trends in higher-education facilities | Building Design + Construction

It provides a stimulating review of new trends in the teaching of astronomy, including: university education, distance learning and electronic media, how students learn, the planetarium in education, public education in astronomy, and astronomy in schools.

Voyager Current Trends in Astronomy In addition the the Current Events links on the left, there are plenty of other cool programs currently underway. In addition, some very exciting projects are just on the horizon. The Sloan Digital Sky Survey is a monumental undertaking - mapping the entire sky with a 2. The goal of this project is to provide accurate astrometry star positions , photometry star brightness and redshifts the velocity of about 1 million galaxies. These CCD mosaics are important as demand for them will rise with the next generation telescopes. The 2 Micron All Sky Survey is designed to image 3 infrared bands at the same time. This has allowed Astronomers to view our own galactic center with unprecedented detail. All sky radio surveys are also underway in both hemispheres: While mapping the CBR has been done, better understanding of the small fluctuations within the CBR gives vital clues as to the formation of the early Universe. Orbiting the Earth, this wonderful tool has collected vital data on the nature of supermassive black holes as well as supernova remnants and planetary nebula. Designed to operate in the infrared, the images captured by the SST is just as dramatic as the Hubble, just in a different wavelength. While it is commonly believed this telescope will take the place of Hubble, in reality it is an infrared telescope designed to improve upon the data collecting ability of the current Spitzer Space Telescope. The king of the Earth based optical observatories are the Keck twins on the peak of Mauna Kea in Hawaii. That will probably remain that way for only a short time. There are some remarkable telescopes on the horizon - either under construction or in the final design stages. Here are a few: The light gathering ability will equal that of an As an added benefit, the LBT is designed to image in the optical and infrared. The design and purpose will model that of the existing Hobbey-Eberly telescope in Texas. A proposed infrared and optical telescope of interest is the Euro50, the Extremely Large Telescope. It is a 50 meter mirror that will contain 2 meter segments. This telescope will be 25 times larger than the Keck. If that is not big enough, another larger telescope is on the drawing board. It will contain around , individual adaptive optic components. This international collaboration will hope for a completion date of 15 years. One of the major goals of this telescope is to perform follow-up observations of data collected from the NGST.

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4: 5 Emerging Trends in 21st-Century Education | Getting Smart

New Trends in Astronomy Teaching by L Gouguenheim (Editor), D McNally (Editor), J R Percy (Editor) starting at $ New Trends in Astronomy Teaching has 1 available editions to buy at Alibris.

When I was asked to chair the Scientific Organising Committee, I considered this proposal to be a great honour, that I acknowledge, and also an exciting way to learn more about the new developments in astronomy education that you are performing, so many of you, all around the world. Then came a hard work! It was my great pleasure, each day, to read your mails on my computer, or on the fax machine a pleasure mixed with some increasing anxiety, when their number began to grow rapidly! The Internet gives this beautiful possibility to interact so easily with people spread out all over the world - you have just to take account of the time zones, which could be also considered as a good astronomical exercise. John Percy likes to say that Commission 46 is different from the other IAU Commissions in the sense that we are all involved in its activity. This is quite obvious, when looking at the list of participants, astronomers and school teachers, coming from all over the world; I would like to mention that many more, who would have liked to attend, were unable to come because of financial worries. The IAU allocated us the maximum grant given to a colloquium, and we are grateful for it; however it proved to be quite insufficient. We have then looked for complementary ones, which was very difficult, and in most cases unsuccessful. I would like to thank the invited speakers, all of those who are presenting contributed talks and posters, with a special mention to Cecylia Iwaniszewska, who has accepted the difficult task to review the posters. In this regard, I would like to make a special mention to my French colleague and friend, Michle Gerbaldi who has stood in for me since that time. I deeply regret that I am not able to be there, and I wish you a rich and successful colloquium. Lucienne Gouguenheim 4 July Astronomy Education: They have made this meeting most enjoyable and successful. Since then, there have been enormous changes - political, economic, and technological - which have affected our work. There have also been about IAU conferences on research topics, but this is only the second on education. We all agree that we must work to correct that imbalance! We are here to catch up on what has happened in astronomy education in the last eight years. We are here to teach and learn, through lectures, posters, and discussions - both formal and informal. We are here to renew old friendships, and make new ones. These human dimensions of this Colloquium are only hinted at in these Proceedings, but I assure you that they occurred. Why is Astronomy Education Important? Education is important to astronomers because it affects the recruitment and training of future astronomers, and because it affects the awareness, understanding and appreciation of astronomy by taxpayers and politicians who support us. We have an obligation to share the excitement and the significance of our work with students and the public. Education is often neglected by the scientific and professional community - not by us, of course - and by many research universities. Our task is not only to be better astronomy educators ourselves, but to convince and train our students and colleagues to do likewise. There are other reasons why astronomy should be part of our education system and our culture. Astronomy is deeply rooted in the history of almost every society, as a result of its practical applications and its philosophical implications. It still has everyday applications to timekeeping, seasons, navigation and climate, as well as to longer-term issues such as climate change and biological evolution. Astronomy not only contributes to the development of physics and the other sciences, but it is an important and exciting science in its own right. It deals with the origin of the stars, planets, and life itself. It shows our place in time and space, and our kinship with other peoples and species on earth. It reveals a universe which is vast, varied and beautiful. It promotes curiosity, imagination, and a sense of shared exploration and discovery. It provides an enjoyable hobby for millions of people, whether they be serious amateur astronomers, armchair astronomers, or casual skygazers. In a school context, it demonstrates an alternative approach to the "scientific method" - the observation vs. It can attract young people to study science and engineering, and can increase public interest and understanding of science and technology - both of which are important in all countries, both developed and developing. Astronomy Education 3 2. What is Astronomy Education? It is important, before we go further, to define astronomy education. I propose to

define it broadly, by quoting Andrew Fraknoi , who posed the following question: Those readers who teach will probably say that it takes place in classrooms like theirs - anywhere from first grade through university. But I want to argue that astronomy education happens in many other places besides the formal classroom. It happens in hundreds of planetaria and museums. It happens at meetings of amateur astronomy groups. It happens when someone reads a newspaper, or in front of television and radio sets. It happens when someone is engrossed in a popular book on astronomy, or leafs through a magazine like Sky and Telescope. It happens in youth groups taking an overnight hike, and learning about the stars. It happens when someone surfs the astronomy resources on the Internet. When we consider astronomy education, its triumphs and tribulations, we must be sure that we do not focus too narrowly on academia, and omit the many places that it can and does happen outside the classroom. Anderson was recently appalled to find that his college astronomy students, writing essays, did not hesitate to quote popular books and TV programs on pseudoscience as authorities! It is unfortunate that we do not have more educators here from planetariums, science centres, publishers, the news media, and amateur astronomy. Perhaps, at the next IAU Colloquium on education, we can devote much more time to the issue of "informal education". The Problems of Astronomy Education If astronomy is so interesting and important, and available in so many settings, why is it not taught in more schools? Why are there so many misconceptions about astronomical topics? Astronomy educators all over the world have discovered "universal" barriers to the effective teaching and learning of astronomy. Some of them have discovered solutions! Astronomy Education f The best or most fortunate students may receive good education, but the others girls, minorities, the disabled, inner-city or rural students - and students in the developing countries - may be left out. Ironically, the problem in elementary school is often that administrators ignore astronomy. In university, they ignore education! Note that these barriers apply, to a greater or lesser extent, at all levels of education, and in all countries of the world. For instance, even in graduate education, there is a need for professional development of instructors and supervisors. There is debate about the relative importance of coursework and practical work. There is a need to attract women and minorities, and a real need to prepare students for jobs in astronomy and elsewhere. We need to take a wider look at astronomy education, and its problems. There are innovative projects and programs in many countries, in many cases well-tested. By taking an international perspective, we achieve a deeper historical and cultural understanding, which is especially important in our multicultural societies. We must also work in partnership with teachers, educators in planetariums and science centres, amateur astronomers, and all others who contribute to astronomy education in its broadest sense. We take some pleasure in knowing that, as astronomy educators, we have "kindred spirits" around the world and, in the case of the developing countries, we take some satisfaction in knowing that we can help scientists and educators less fortunate than ourselves. Varieties of Astronomy Education Even within formal or classroom astronomy education, there are many varieties as you will quickly learn at this meeting. There are the two systems of education eloquently described by Don Wentzel in the introductory lecture at the last IAU Colloquium on astronomy education - the European system, and the North American system. There are also two or more methods of education: There are many opinions about astronomy education curriculum: If astronomy is taught as a course unit, should it emphasize classical content or current developments, core concepts or interdisciplinary or speculative topics; topics relevant to everyday or abstract topics like black holes; selective or comprehensive coverage; depth or breadth? If there is practical work, should it be sky-based, or computer-based? If sky-based, should it be daytime or nighttime? Or should there be elements of all of the above? The Needs of the Developing Countries Whichever systems and methods are used, the developing countries face problems not encountered by astronomy educators elsewhere. Their special needs include: Astronomy Education 5 Many of the programs and projects of the International Astronomical Union, described elsewhere in this meeting, address these needs. I use the term "developing countries" broadly. Of the almost states which are recognized by the United Nations, about have some form of organized astronomical activity - either professional or amateur. About half those countries adhere to the IAU. Of those, less than half could be considered fully developed, considering that the countries of Eastern Europe and the former Soviet Union still face many economic obstacles, despite their rich astronomical heritage. I am including Canada and the US among the developed countries, even though astronomers there have many

concerns about the quality of their education system! In many developing countries, there is only one "lone astronomer" at most a small group to do all the educational, research and administrative work which is shared among many in the more developed countries. The accomplishments of these individuals are remarkable. They should be an inspiration to all of us. I am glad that a few of them are here at this Colloquium. Astronomy Education Around The World It is tempting to try to review all aspects of astronomy education, at all levels, in all countries, but I shall resist the temptation. You will learn all you want to know from this meeting, and from the people who are here. In the Colloquium, at this point, I showed a large number of slides of astronomy education around the world. They illustrated the education projects and programs of the IAU, as well as local initiatives- some of which are described at this meeting. Astronomy Education - publicize the practical and cultural benefits of astronomy give or arrange a public lecture or other such event write a popular article on astronomy meet with students, teachers and the public encourage interested students, especially women and other under-represented groups - support your local elementary and secondary school e Get more and better astronomy in: This seems like a daunting list, especially when read all at once. I do not ask astronomers to devote all their time to education unless, of course, that is what they are paid to do. If each astronomer were to spend at least 10 per cent of their time on education, having made a conscious effort to learn more about astronomy education, and to co-ordinate their work with that of others, the results would be quite remarkable! I urge you to read that article, and help make my dream come true! Ros, Universidad Politecnica de Catalunya, Current Developments, Future Co-ordination, ed.

5: L. Gouguenheim (Author of New Trends in Astronomy Teaching)

New trends in university education in Russia: teaching Natural History for humanities By Sergei A. Gulyaev Astronomy Dept., Ural State University, Ekaterinburg, Russia A reform of the content of university education is taking place in Russia today.

We continue the discussion with four more trends that are shaping collegiate projects: The growing use of project-based teaching The pressure to hold costs down as rising tuition and fees outpace inflation A movement to promote cross-disciplinary collaboration New technologies that are changing pedagogy and how students and faculty interact 1. So, classrooms must change to meet these new demands. Instructors sit at a workstation in the center of the room. A typical class includes hands-on experimentation supported by interactive digital media. New and renovated classrooms at many institutions include easily movable furniture and media-rich presentation technology. Missing from this picture: Students can project their work onto a single screen for their own group or onto multiple screens for the whole class to view. That makes it more critical for administrators to maximize the utilization rates of updated classrooms. In many cases, multiple departments must share these spaces, which goes against the grain of many institutions that are accustomed to having dedicated buildings for each discipline. A test bed for new classroom design, Duke has undertaken a detailed assessment of the Link for lessons on how other classrooms could be redesigned. The flexibility to reconfigure space for different uses is built into many collegiate projects today. Speakers, cameras, microphones, and monitors can be easily installed and moved as needed. An IT support group is housed within the Link for assistance with the technology. Some classrooms have their own connected breakout rooms for group work. A large, open lobby area and wide corridors offer additional space for working groups to use. Large whiteboards on wheels and movable furniture allow groups to create their own nooks. Furniture in Link classrooms is easily reconfigurable. Each classroom has slides posted on the wall to demonstrate multiple configurations; before class, students rearrange the furniture from these templates. Most plumbing, electrical, communication, and HVAC systems have been positioned in the ceilings so that the walls can be easily moved or removed. The typical small business stays in an incubator for about 39 months, he says, so reconfigurations would not be necessary often enough to justify the cost of demountable partitions. The building will be constructed so that additional wings could be connected on the ground floor at several locations in the future. Increasingly, universities want flexible spaces that can have multiple uses over their lifetimes. For example, by using raised access flooring with displacement ventilation, a space can be inexpensively converted from a to seat classroom to five faculty offices by using movable, interchangeable wall systems. Huddle space for students, faculty groups, and researchers is being set aside to promote interaction. Co-locating different disciplines within the same building is an increasingly common tactic, all in the belief that more effective learning, higher-quality research, and greater levels of innovation result when academics from different backgrounds and disciplines work in close proximity. Shared conference rooms and kitchenettes will be centrally located within bridges connecting two wings. Many universities are relocating at least part of their print collections to remote storage facilitiesâ€”some using robotic automated retrieval systemsâ€”so that precious library space can be repurposed. Scholars can reserve them on their laptops for later pickup. At some community colleges and primarily commuter colleges, library space has been converted to lounges and group study rooms, which are lacking at these institutions. Some collegiate libraries are supplementing the campus computer lab by carving out space for media rooms equipped with large-screen, high-definition monitors and high-end software for video production or other functions that are out of the price range of most students.

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6: New Trends in Astronomy Teaching - PDF Free Download

In all countries (and particularly the developing ones), astronomy can attract young people to science and technology. Much is known about how to teach astronomy effectively, at all levels, both.

Download image The first pair of columns in Table 1 present the ratios of total compensation to W-2 wages for state and local Kâ€”12 public school teachers and for professionals. These ratios allow us to examine how important wages are relative to benefits in the total compensation package. So for example, we see that in , for every dollar in W-2 wages teachers are provided One reason health and pension costs are higher for teachers is that teacher health benefits are provided for a full year for workers who receive salaries for less than a full year. The benefits advantage in was 7. This current benefits advantage means primary and secondary public school teachers have a benefits advantage that somewhat offsets the wage disadvantages they face. To see how the benefits advantage figures presented in the table were calculated, consult Allegretto, Corcoran, and Mishel , Chapter 4, and Allegretto, Corcoran, and Mishel , Chapter 4. Adding together the wage penalty column and the benefit advantage column gives the overall compensation gap. The growth in the benefits advantage means that the relatively better benefits for teachers have somewhat offset the worsening wage picture for teachers. The total teacher compensation penalty was a record-high The wage penalty grew substantially since , as noted above, rising Between and , however, the 6. The result was the corresponding 3. These trends in wages and benefits are probably related. Recent years have seen extreme pressure on school district budgets to curtail hiring and costs. It may be the case that teachers and school districts have sought to preserve benefits by restraining wage costs. If this were the case relative to the employers of professionals we would observe a greater teacher wage penalty with a partially offsetting increased benefits advantage. The bottom line is that since the teacher compensation penalty has increased by Conclusion The opportunity cost of becoming a teacher and remaining in the profession becomes more and more important as relative teacher pay falls further behind that of other professions. The large wage penalty for male teachers likely is a key reason why the gender mix of teachers has not changed much over time. That women, once a somewhat captive labor pool for the teaching profession, have many more opportunities outside the profession today than in the past Corcoran, Evans, and Schwab means that growing wage and compensation penalties will make it all the more difficult to recruit and retain high-quality teachers. Moreover, the ever-increasing costs of higher education and burdensome student loans are also a barrier to the teaching profession in light of a widening pay gap. The recent trends we document in this report with CPS-ORG data represent only a small part of a much larger long-run decline in the relative pay of teachers. Among all male and female public school teachers, the relative wage disadvantage grew almost 20 percentage points over â€” Allegretto, Corcoran, and Mishel , 7. Our results in this paper show that the teacher wage penalty grew an additional 8. Improvements in the nonwage benefits of primary and secondary school teachers have partially offset the worsening wage disparities. The weekly total compensation wages plus benefits penalty for teachers in was It is good news that teachers are able to bargain for a total compensation packageâ€”though it seems they may have forgone wage increases for benefits recently. This makes the wage penalty, on its own, critically important as it is only earnings that families can put toward making ends meetâ€”its only earnings that can pay for expenses such as rent, food, and student loan payments. If the policy goal is to improve the quality of the entire teaching workforce, then raising the level of teacher compensation, including wages, is critical to recruiting and retaining higher-quality teachers. Policies that solely focus on changing the composition of current compensation e. Simply put, improving overall teacher quality, preventing turnover, and strengthening teacher retention requires eliminating the teacher pay penalty. About the authors Sylvia A. Allegretto is a labor economist and chair of the Center on Wage and Employment Dynamics, which is housed at the Institute for Research on Labor and Employment at the University of California, Berkeley. Teacher Pay Losing Ground. She has a Ph. Lawrence Mishel is a distinguished fellow and former president of the Economic Policy Institute. He is the co-author of all 12 editions of The State of Working America. His articles have appeared in a variety of academic and nonacademic journals. His areas of research include labor economics, wage and income distribution, industrial

relations, productivity growth, and the economics of education. He has a Ph. Data and methodological issues In this appendix we provide a summary of the data used in this analysis. Further documentation can be found in Allegretto, Corcoran, and Mishel The teachers studied here are elementary, middle, and secondary school teachers teachers not included are kindergarten, early education and special education. The CPS is the monthly survey administered by the BLS to more than 60, households to measure and report on unemployment. Since , the CPS-ORG survey has asked respondents to report their wages on a weekly, biweekly, monthly, or annual basis whichever the respondent finds most appropriate , from which the BLS then derives the weekly wage. More than half of teachers report an annual as opposed to a monthly, biweekly, or weekly wage to BLS. Respondents also report the hours they worked last week. Teachers are identified using detailed census occupation codes, and include only elementary and secondary teachers prekindergarten and kindergarten teachers, adult educators, and special education teachers are excluded. This analysis also only focuses on public school teachers private school teachersâ€”who on average earn less than public school teachersâ€”are excluded. Second, we expand on the explanation we gave in the body of the report on why we compare weekly, as opposed to annual or hourly, earnings. Third, we note several coding changes over the period under study. When a survey respondent fails to report any earnings, the BLS imputes his or her earnings. The problem arises here because occupation is not necessarily one of the criteria used in imputing earningsâ€”nonresponding teachers are more often than not assigned the average earnings of nonteacher college graduates. Given differences in the earnings and work year of teachers and nonteachers, this procedure creates a systemic bias in the comparison of teacher earnings with that of other professionals, as imputed teacher earnings are systemically overstated. In , imputed earnings data in the CPS-ORG were 17 percent; by imputations accounted for 33 percent of the sample, and in they made up 41 percent of the sample. The implications for our analysis of the teacher wage gap are significant. In the early years, through , the teacher wage gap differential between using all the data available without regard for imputations and analyzing only non-imputed observations was at most a 2 percentage-point differenceâ€”meaning that the inclusion of imputed data lessened the teacher wage gap by 2 percentage points or less. But, post the gap steadily grew, and in the differential was larger than ever. For all teachers, the teacher wage penalty of The bias in closing the gap is 6 and 9 percentage points for female and male teachers, respectively. Imputed data are not available in and only for the last four months of Thus, we extrapolate results for these two years by comparing output from using all the data available to output from using non-imputed data only. We do this comparison for the years just prior to and just after and Comparing the results gives us a reasonable rough estimate of what may be expected if non-imputed data were available for and Weekly wage This analysis of the relative wage of teachers relies on comparisons of weekly earnings, rather than annual or hourly earnings, the approach taken by some authors e. It is often noted that the annual earnings of teachers cannot be directly compared with those of nonteachers, given that teachers are typically only contracted to work a nine-month year. But differences arise over exactly how much time teachers devote to their position outside of their nine contracted months of teaching. Teachers spend some of their summer months in class preparation, professional development, or other activities expected of a professional teacher. Teachers who may wish to earn additional income during the summer months can often do so, but are unlikely to be able to earn at the same rate of pay as in their teaching role. Similarly, attempts to compare the hourly pay of teachers and other professionals have resulted in considerable controversy by setting off an unproductive debate about the number of hours teachers work at home versus other professionals. Changes in relative wages can be expected to be similar as long as the relative work time between teachers and comparable professionals remains constant. For example, if the ratio of weekly hours worked by teachers relative to those worked by comparable workers remains constant over time, then estimates of changes in hourly wages will be the same as for weekly changes. Similarly, estimated changes in relative annual earnings will parallel those for weekly earnings as long as the annual weeks and hours worked by teachers have not changed relative to those of comparable workers. As expected, the annual wage gap is just the weekly wage gap multiplied by the ratio of teacher and nonteacher annual weeks worked, with the caveat that we have more confidence in the post-redesign CPS data. Our benchmarking exercise leaves little doubt that there has been deterioration in the relative earnings of teachers

over time. Moreover, our use of weekly wage comparisons in all of our work on teacher pay allows us to avoid unproductive discussions of work years, summers off, and so on. The change in the CPS survey question on earnings appears to have resulted in a significantly higher weekly wage among teachers, as teacher wages rose The additional 8 percent wage growth among teachers appears to represent the effects of a correction for the underlying bias in the pre survey. Consequently, our estimates incorporate the pre data in a way that does not allow this bias to be built into our results. A second issue concerns the coding schemes regarding education. Appendix B Estimated public school teacher weekly wage gap, â€" Year.

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In astronomy education, scale A represents the level of branches and fields of astronomy and astrophysics, where interconnections between various astronomical disciplines are shown.

Getty Images Pressure continues to increase on education budgets around the globe. Yet despite this fact, the education sector is continuing to increase its investment in technology related to learning. Ed tech funding jumped 55 percent in with no signs of slowing down, according to CB Insights. With that in mind, here are five top trends in ed tech to keep on your radar screen in and beyond: The Clayton Christensen Institute predicts growing momentum for online corporate learning initiatives. Just how big will it get? In contrast to the academic Massive Open Online Courses MOOCs that are still struggling to find the best path to a reliable revenue stream, businesses focused on corporate e-learning have found a business model that works--and works well. Unlike with classroom-based training, learners can train on their own time using customized formats. Everyone can move at their own pace, learning what they need to know and exploring their own interests. Though still a relatively young industry, corporate e-learning promises to deliver new models of teaching and a future of exciting breakthroughs. In conjunction with the building momentum in online corporate learning, expect to see intensified focus in on identifying better ways to assess skills and measure individual progress, competency-based learning, and ultimately ROI. The Clayton Christensen Institute notes that when we provide customizable education, it becomes important to ensure that modular learning experiences are blended together in a way that fosters cohesion. To do so requires efficient ways to measure and track student learning to guarantee smooth interchanges between each learning experience. This allows us to give learners an SAT-like score for any skill, which could provide the foundation for a new industry standard around skills measurement. Any company that offers MOOCs needs to address better skills assessment if they want to survive. Gone are the days when students have to rely only on text-based--or even video-based--tutorials. While those are still effective, new types of learning styles will continue to emerge in , offering online learners more interactive experiences like writing code directly in the browser, or completing online challenges as part of the learning process. Pluralsight had this trend in sight with our latest acquisition of Code School. Code School offers a unique approach that relies on an alternative learning style that we believe is more fun, engaging, and effective than just plain videos. This is the type of new, interactive learning style that you can expect to see much more of in the education segment. While competency-based training approaches and online learning are nothing new, the blend of the two is creating a revolutionary approach to education. Weise and Clayton M. Christensen write that online competency-based education has "great disruptive potential" because it incorporates not only the right learning model, but the right technologies, customers, and business model. Weise and Christensen go on to explain that providers of online competency-based training "can cost-effectively combine modules of learning into pathways that are agile and adaptable to the changing labor market. How can providers of these technologies create a diversity of stackable programs for a wide range of industries, scale them, and also keep costs down? By fusing modularization with assessments to effectively measure the competencies. Online competency-based learning opportunities--such as those offered by the online degree programs at Western Governors University and Southern New Hampshire University --help students through targeted learning outcomes, customized support, and portable skill sets that employers care about. Expect this trend to highlight the important role of employers to create a value network that helps students connect directly with potential job opportunities. Information Week identifies technology for flipped learning as another key ed-tech trend in A flipped class is a form of blended learning where students watch video lectures outside of class to learn content online, and then do their homework in class with the guidance of teachers in person. This approach helps to engage students outside of the classroom as well as in it. Harman Singh notes that designers of the online tools and video streaming that are central to this approach must prioritize optimizing them for interactivity. Look for next-generation cloud-based, mobile, and app solutions--with powerful analytics to measure student responses--to replace outdated learning management systems in Khan Academy is currently leading this type of disruption in the K

space. As the education sector continues to embrace the power and promise of digital learning and the best that ed tech has to offer, I leave you with one caveat: Horn and Heather Staker point out in their book Blended: Feb 3, More from Inc.

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