

Research Application Summary

Key thematic areas of interest in University-Based Research Designed and implemented in the perspective of Community/Sector-Wide Engagements and Outreach to End-Users

Nampala, M.P.¹, Waswa, M.¹, Makuma-Massa, H.², Bobe, B.³ & Adil, D.⁴

¹Regional Universities Forum for Capacity Building in Agriculture, P. O. Box 16811, Wandegaya, Kampala, Uganda

²College of Agricultural and Environmental Sciences, Makerere University, P. O. Box 7062, Kampala, Uganda

³African Center of Excellence for Climate Change and Biodiversity Conservation, Haramaya University, P. O. Box 138 Dire Dawa, Ethiopia

⁴University of Gezira, PO Box 20, Wadmadeni, Gezira, Sudan

Corresponding author: p.nampala@ruforum.org

Abstract

This paper provides a synthesis of priority thematic areas of interest for research undertakings designed and implemented by university-based research teams in collaboration with stakeholders. The data for this synthesis are derived from two Competitive Grant Systems (CGS) that target support to enhance university research and training, namely, the competitive grants awarded by the Regional Universities Forum for Capacity Building in Agriculture CGS and the projects under the African Centers of Excellence (ACE II) which is supported by the World Bank in partnership with respective African National Governments. Both granting facilities are intended to build capacity of the main beneficiary that is, universities to enhance their contribution to socio-economic development. The grants awarded are intended to generate knowledge and which through institutionalization of organizational structures and uptake pathways is envisaged to promote community engagement and outreach to end-users. The synthesis of thematic areas implemented and on-going indicates evidence that research teams at universities in Africa are engaged in efforts to generate solutions to address emerging and re-emerging global challenges (e.g., Natural Resources Management, Climate Change, Food and Nutrition Security). The establishment of ACEs is an opportunity to strengthen partnerships in higher education. The thematic research areas identified by stakeholders but not supported through on-going efforts and/ or require more support should serve as leverage points for soliciting resources and designing research for development actions. These efforts should result in building and/ or strengthening research culture - this ranges from trying to build a culture where there is none, to strengthening the existing culture.

Key words: Competitive grants systems, global challenges, research teams, universities in Africa

Résumé

Cet article présente une synthèse des domaines thématiques prioritaires d'intérêt pour les recherches et entreprises par des équipes de recherche universitaires en collaboration avec les parties prenantes. Les données pour la présente synthèse sont dérivées de deux systèmes de subventions compétitifs

(CGS) pour améliorer la recherche et la formation universitaires, à savoir les subventions compétitives accordées par le Forum régional des universités pour le renforcement des capacités en agriculture CGS et les projets des Centres d'Excellence Africains (CEA II) soutenus par la Banque mondiale en partenariat avec les gouvernements nationaux des pays africains. Ces deux mécanismes de subvention visent à renforcer les capacités du principal bénéficiaire, à savoir les universités, à renforcer leur contribution au développement socio-économique. Les subventions accordées sont destinées à générer des connaissances et qui, grâce à l'institutionnalisation des structures organisationnelles et des voies d'adoption, doivent promouvoir l'engagement communautaire et la sensibilisation des utilisateurs finaux. La synthèse des domaines thématiques indique que les équipes de recherche des universités en Afrique font des efforts pour générer des solutions et relever les défis mondiaux émergents (par exemple, la gestion des ressources naturelles, le changement climatique, la sécurité alimentaire et nutritionnelle). La mise en place des CEA est une opportunité de renforcer les partenariats au niveau de l'enseignement supérieur. Les domaines de recherche thématiques identifiés par les parties prenantes mais non soutenus par des efforts en cours et / ou nécessitant plus de soutien devraient servir de points de levier pour solliciter des ressources et concevoir des actions de recherche pour le développement. Ces efforts devraient aboutir à la construction et / ou au renforcement de la culture de l'excellence de la recherche.

Mots clés: Systèmes de subventions compétitives, défis mondiaux, équipes de recherche, universités en Afrique

Introduction

There is demonstrated evidence that universities in Africa are keen to enhance excellence in research to generate innovations and inventions for addressing key development challenges. This assertion is attested by (a) the implementation of innovative research projects and programmes such as the Higher Education Research and Advocacy Network (HERANA); (b) growing networks and institutions such as the Africa Universities Research Alliance (ARUA) and the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) and several others whose mandates and missions are anchored in pursuing excellence in research at universities in Africa (Nampala *et al.*, 2016a; UWN, 2018); (c) the enactment of continental and sub-regional policies and frameworks such as the Continental Education Strategy for Africa (CESA); and (d) reinvigorated support for higher education from national governments and development partners such as the African Higher Education Centers of Excellence Programme. Similarly, the push and pull forces associated with the “knowledge economy” have over the past couple of decades given rise to new economic, social, political and cultural challenges to which nations and regions are increasingly repositioning their higher education systems and institutions to respond and generate appropriate solutions.

To this end, there is consensus among stakeholders that higher education institutions should play a key role in delivering knowledge requirements for development (Cloete *et al.*, 2012). Earlier studies have revealed a strong association between higher education participation rates and levels of development. While the higher education participation rates in many high-income countries are well over 50%, in sub-Saharan Africa they are in most cases below 5% (Bloom *et al.*, 2006) but increasing at an increasing rates owing to the rapid expansion of, that has enhanced access to, the higher education sector. Furthermore, there is increasing evidence that high levels of education in general, and of higher education in particular, are essential for the design and productive use of new technologies, while they also provide the foundations for a nation's innovative capacity, and contribute more than any other

social institution to development of civil society (Carnoy *et al.*, 1993; Serageldin, 2000). Research at HEIs in Africa is targeted with regard to addressing national and indeed societal challenges as well as for purposes of training human-resource in key gap areas. It is therefore vital for HEIs in Africa to address through design and implementation of research relevant thematic areas that will accelerate production of the much needed human capital while at the same time generate plausible solutions to pressing challenges in society. This paper draws a synthesis from selected on-going efforts of university-based research designed and implemented in the perspective of community/sector-wide engagements and outreach to end-users with a view to map out priority thematic areas that are being addressed and/or otherwise.

Methodology

This paper is based on data synthesis of broad thematic areas supported in grants and projects awarded to research teams and programs at universities in Africa by RUFORUM and precursor project the Forum for Agriculture Resource Husbandry (FORUM) for the period 1992 - 2017. The data also draws from thematic areas supported under the World Bank African Centers of Excellence Initiative. The grant awarding agencies had opportunity to engage the respective university research teams and their representatives (particularly the Deans and Principals) prior to the Call for proposals through the competitive granting process. Thus, the data also includes a synthesis of thematic areas for which over 80 universities in Africa highlighted as key to their respective national development priorities. Subsequent to the established of Africa Higher Education Centers of Excellence (ACE) in West Africa (ACE Phase I); the World Bank and respective National Governments in Eastern and Southern Africa engaged relevant stakeholders in the design and implementation of ACE Phase II.

The RUFORUM participated in these engagements and actively engaged in ACE phase II process by preparing its member universities to prepare and submit applications in response a competitive bid to establish ACEs in their countries. Participation by RUFORUM in preparations for the ACE II was informed by the fact that the initiative speaks directly to the Network's mission which is to "strengthen the capacities of universities to foster innovations responsive to the demands of smallholder farmers through the training of high quality researchers, the output of impact-oriented research, and the maintenance of collaborative working relations among researchers, farmers, national agricultural research institutions, and governments'. RUFORUM mobilized stakeholders through convening events both at National and Regional levels. Examples of convening events at which discussions on thematic areas of interest for Research and development were made are presented in Table 1. The grey literature (i.e., documentation) in reports, minutes, declaration and draft proposals provided the resource materials for synthesizing the thematic areas presented in this paper.

Results and discussion

Thematic areas supported under the RUFORUM Competitive Grants System for the period 1992 - 2017. The thematic categorization of grants awarded at RUFORUM member universities through the competitive grants system is presented in Table 2. The broad categories highlighted are in line with research and training focus at colleges of Agricultural, Veterinary, Environment and other related sciences. They also demonstrate efforts to respond to changing landscape in the labor market demands to address emerging and re-emerging challenges. For instance, a focus on climate change and environment, ICTs in Agriculture, Gender in Agriculture, and Rural Innovations could be considered emerging thematic areas addressing contemporary issues as opposed to the traditional thematic areas of Crop Improvement, Soil Fertility and Agroforestry, among others.

The thematic area on building the demand articulation for research and capacity building interventions in community action research has the largest number of grants. This is a key focus of RUFORUM interventions and it entails awards to faculty and students to undertake research with communities. The demand articulation theme is followed by Crop Improvement at 130 projects of 603 stands out as the most predominantly supported commodity thematic area. The key gap areas associated with the research and development continuum mostly entail value chain constraints including value addition and product development as well as marketing.

The high number of projects in the Crop Improvement thematic area can be explained by the value-chain commodity-wise approach to design and implementation of research within the National Agricultural Research System. This approach facilitates generation of plausible researchable problems that cover the entire continuum of production to consumption with several attributes addressed under the crop improvement theme, including research to address several challenges on biotic and abiotic stresses. This in part also explains the high number of proposals submitted on the crop improvement theme. Taking an example of the rice value chain, the stakeholders preference to be considered by rice breeding programs would be a rice variety that is suited to all the stages of the chain indicated in Table 3.

Unlike in crop improvement research, the other thematic areas for example livestock management rarely take on a commodity-based approach in designing research for development projects. Fortunately, for both the livestock and crop improvement thematic areas, the focus of the research designed and implemented in other thematic areas would also in most cases address as cross-cutting issues aspects that lend themselves to broader aspects of improving crop and livestock husbandry. Also important to note is that fact that the number of projects awarded across the years timeframes is contingent to the amount of funds available for sub-granting. For this reason, the period 2009 – 2017 is higher with 450 (i.e., the sum of the totals for the period 2009 – 2014 and 2015 – 2017) than for the period 1992 – 2007 with 153 projects.

Research Themes listed by universities during the preparatory phase for preparing submissions ACE II Call for Proposals. The list of thematic areas of interest submitted at various convening events is given in Table 4. Climate Change, Environmental Sustainability and Agribusiness were by far the most frequently listed thematic areas in the process of preparation for the ACE II proposal development and partnership brokerage/ formation. A comparison of the established Centers of Excellence (see Table 5) at various universities in different countries indicates that the supported thematic areas through the ACE II projects are part of the wish list generated by stakeholders ahead of the Call and final award process (Table 4). Nonetheless, the wish list is by far broader than the now on-going efforts. Similarly, the on-going projects under the ACE II also have aspects of strategic sectors (such as Transport/Railway, Public Health, Oil and Gas, and Sustainable Mining) that are key leverage areas and drivers for socio-economic growth that were otherwise not highlighted during the stakeholder meetings (see Table 1). This observation is in part explained by the fact that while the stakeholder meetings were attended mostly by actors from Agricultural and Environmental Sectors, the ACE II Program priorities areas included a more broad range of sectors.

Table 1. Selected Higher education and agricultural sectors stakeholder convening events 2013 - 2017

Dates	Location, Meeting Venue	No. of Participants	Key outputs
14th–17th 2013	June Entebbe, Uganda	64	Principals & Deans Report
19th–25th July 2014	Maputo, Mozambique	700	Principals & Deans and 4th All Africa Higher Education Week Report & Conference Communique
17th December 2014	Kampala, Uganda	20	Joint Meeting Vice Chancellors and Higher Education Officials from Ministry of Education and Sports, Uganda Minutes
10th February 2015 and 20th April 2015	Kampala, Uganda	136	Two National Forum Meetings Reports
8th – 10th June 2015	Khartoum, Sudan	125	Principals & Deans Report & Declaration
15th – 19th September 2015	Entebbe, Uganda	52	Proposal Finalization Workshop Final Draft Proposals
27th – 28th July 2017	Gaborone, Botswana	50	Higher Education Stakeholder Report

Source: Compiled by authors

Table 2. Thematic areas supported under the RUFORUM Competitive Grants System for the period 1992 - 2017

Category	1992-2003	2004-2008	2009-2014	2015-2017	Total
Demand Articulation for Community Action Research	0	15	76	153	244
Crop Improvement	51	24	47	8	130
Skills Enhancement for Staff and Students	0	2	16	38	56
Soil Health and Fertility	19	6	16	1	42
Livestock Management	1	4	19	13	37
Climate Change and Environment	4	6	20	2	32
Agribusiness/Marketing	3	2	18	7	30
Extension and Rural Development/innovations	7	3	10	3	23
Agroforestry	4	1	1	0	6
ICTs in Agriculture	0	0	1	1	2
Gender in Agriculture	1	0		0	1
Total	90	63	224	226	603

The ACE II places emphasis on building partnerships for research and academic excellence. This is very appropriate especially considering the fact that the design and implementation of research that generates appropriate solutions that will be mainstreamed in uptake necessitates engagement of communities and end-users as equal partners. It is through these engagements with communities and the sector that end-users effectively contribute to cohort learning and knowledge co-creation that ultimately impacts on design and implementation of fit-for-purpose curriculum.

Table 3. An example of a functional analysis table for rice commodity value chain

Stage of chain	Function	Agent	Output
Production	Cultivation	Small farmers	Rice paddy
	Cultivation	Large farmers	Rice paddy
Primary marketing	Marketing transport to mill	Village traders	Paddy delivered to private millers
		Local traders	Paddy delivered to private mills
		Co-operative traders	Paddy delivered to Co-operative mills
Miller	Milling	Private millers	<u>Delivered to wholesalers</u> white rice broken rice
		co-operative millers	<u>To noodle industry</u> milled rice <u>To animal feed industry</u> rice bran <u>To exporters</u> white rice broken rice <u>To retailers</u> broken rice
Factories	Processing	Noodle industry	Noodles to wholesalers Noodles to exporters
Marketing	Marketing transport	Wholesaler-white rice Wholesaler-broken rice	Broken rice White rice Noodles
Export	Marketing transport	Exporters-broken rice Exporter- white rice Exporters-noodles	broken rice white rice noodles
Retail	Transport final	Retailers-white rice Retailers-broken rice Retailers-noodles	Broken rice White rice Noodles

It is not clear whether one ACE can adequately address the demand for particular thematic areas as expressed in the frequency; instead it may be plausible to consider sub-regional nodes to expand the scope and volume of research for thematic areas with high demand. Besides exploring complementarities, this will also help address contextual issues especially considering the fact that Africa is diverse and impactful research on themes such as climate change and biodiversity necessitate localization (Nampala *et al.*, 2016b). The thematic areas for research and training that have not received support present opportunity for designing complimentary initiatives. Indeed RUFORUM has been actively engaged with the World Bank and partners to design the “Strengthening Agricultural Higher Education for Agri-Food System Transformation in Africa, SHAEA” Project which will provide opportunity for strengthening universities to effectively work with stakeholders to address gaps in research and training for six key thematic areas of (1) Agribusiness and Entrepreneurship; (2) Agri-food Systems and Nutrition; (3) Rural Innovations and Agricultural Extension; (4) Agricultural

Table 4. Expressed thematic areas of interest by universities represented at the 11th Principals and Deans Meeting held in June 2015, Khartoum, Sudan and other stakeholder meetings

University	Thematic Areas of interest in preparation for ACE II
Universite' Envangelique Afrique	Climate Change and Land Management GIS and Remote Sensing in Agriculture
John Garang University	Climate and Environmental Smart Agriculture Agribusiness • Seed Science and Technology
University of Antanarivo	Food Science and Engineering Biodiversity Management Environment and Climate Smart Agriculture Environmental Economics Natural Resources Management Information and Communication Technology (ICTs)
University of Mzuzu	Science, Technology, Engineering and Mathematics (STEM) Energy Hydrology and Water Purification Information and Communication Technology Agriculture and Water Resource Management Aquaculture and Fisheries Climate and Environment Smart Agricultural
Egerton University	Agribusiness Management Climate and Environment Smart Agriculture Science, Technology, Engineering and Mathematics (STEM)
Makerere University	Integrated animal resources development and food safety Zoonosis and Biosecurity Climate Smart Agriculture - Environmental sustainability, Integrated farming systems, Organic farming and Food Systems and Climate Change and Risk Agriculture Value Chain and Agri-business Plant Breeding and Seed Systems Agri-business Development Post-harvest and Food Safety Agricultural policy and Agricultural Information and Knowledge Management Digital Preservation of Indigenous Knowledge Science, Technology, Engineering and Mathematics (STEM)
Ndejje university	Energy generation from municipal solid waste (STEM)
Jomo Kenyatta University of Agriculture and Technology	Food and Nutrition Research Methods
University of Juba	Agri-business Climate and Environment Smart Agriculture Water Resource Management Hydrology and Irrigation Application of GIS in cropping partners in drought prone agro-ecological zones Value Addition in Horticultural Crops

Table 4. Contd.

University	Thematic Areas of interest in preparation for ACE II
Uganda Martyrs University	Agro-Ecology and Food Systems
Kenyatta University	Environment and Climate Smart Agriculture Material Science and Applications in Renewable Energy Agricultural Biotechnology applications in Climate Smart Agriculture Health - Medicinal Plants Research ICT applications in Agricultural STEM, Applied Statistics Higher Education Quality Assurance
University of Swaziland	Agri-business Value Chains Climate/Environmental Smart Agriculture Food Science and Nutrition
National university of Lesotho	Climate and Environmental Smart Agriculture Agribusiness
Busitema University	STEM: Hydrology, Water and ICT Environment and Climate Change Water and Irrigation Systems Health and Bio-medical Technology Fisheries and Aquaculture,
Nelson Mandela African Institute of Science and Technology	Agriculture focusing on Animal Health, Diagnostics, Disease Control Agricultural intensification, focusing on nitrogen fixation Health and Medical engineering (vaccines, immune bio systems, medicinal plants, adjuvants)
The Copper Belt University	Natural Resource Management Agri-business Climate Change and Environmental Smart Agriculture
Gulu University	Agribusiness and Food Systems
University of Eldoret	Thematic Areas of interest in preparation for ACE II Seed Science and Technology Sustainable Land Resources Management Water Use Efficiency and Waste Management STEM Agri-Business
Uganda Christian University	Waste Management Agribusiness STEM Information systems and ICT

Table 4. Contd.

University	Thematic Areas of interest in preparation for ACE II
Moi University	STEM Renewable energy Textile engineering Analytical chemistry Electronics Health Plant Pathogens - Diagnostics, Entomology, Parasitology
University of Rwanda	Climate and Environment smart agriculture Biodiversity Water Resources Management Aquaculture and Fisheries Hydrology and Irrigation Veterinary Medicine Food Security ICTs
Mekelle University, Ethiopia	Climate and Environment Smart Agriculture Water Resources Management Agricultural Land Management
Lilongwe University of Agriculture and Natural Resources (Malawi)	Water Resources Management Aquaculture and Fisheries
University of Nairobi	One Health Innovations in Climate Smart Agriculture
Haramaya university	Climate and Environment smart agriculture Agri-business Veterinary Medicine - Zoonoses (one health), Wild life health Epidemiology and biostatistics
University of Gezira	Climate and Environment Smart Agri-business Agricultural Land Management Water Resource Management

Risk Management and Climate Change Proofing; (5) Agricultural Policy Analysis; and, (6) Statistical Analysis, Foresight and Data Management.

Conclusion and recommendations

RUFORUM has over the years implemented a competitive research scheme for universities that has promoted relevance of the university as a knowledge generation institution. The emphasis on “conducting research with” as opposed to “conducting research on” communities (Nampala, 2017) has popularized and led to institutionalization of the community action research program as good mechanism

Table 5. Africa Higher Education Centers of Excellence in Eastern and Southern Africa

Name of ACE	Host Institution and County
African Center of Excellence for Climate Smart Agriculture and Biodiversity Conservation (Climate SABC)	Haramaya University, Ethiopia
Centre for Innovative Drug Development and Therapeutic Trials for Africa (CDT-Africa)	Addis Ababa University, Ethiopia
ACE for water management	Addis Ababa University, Ethiopia
African Railway Education and Research Institute (ARERI)	Addis Ababa University, Ethiopia
Sustainable Agriculture and Agribusiness Management	Egerton University, Kenya
Sustainable Use of Insects as Food and Feed	Jaramogi Odinga Oginga University of Science & Technology, Kenya
Phytochemicals Textiles and Renewable Energy	Moi University, Kenya
Aquaculture and Fisheries Science (AquaFish) Centre of Excellence	Lilongwe University of Agriculture and Natural Resources, Malawi
Center for Public Health and Herbal Medicine (CEPHEM)	University of Malawi - Malawi College of Medicine, Malawi
African Center of Excellence in Energy for Sustainable Development (ACEESD)	University of Rwanda - College of Science & Technology, Rwanda
African Center of Excellence in Internet of Things (ACEIoT)	University of Rwanda - College of Science & Technology, Rwanda
African Centre of Excellence in Innovative Teaching and Learning Mathematics and Science (ACEITLMS)	University of Rwanda - College of Education, Rwanda
African Centre of Excellence for Data Sciences (ACE - DS)	University of Rwanda - College of Business & Economics, Rwanda
African Centre of Excellence for Innovative Rodent Pest Management and Biosensor Technology Development (IRPM&BTD).	Sokoine University of Agriculture Tanzania
Southern African Centre for Infectious Disease Surveillance (SAC-IDS) - ACE for Infectious Diseases of Humans and Animals in Southern and East Africa.	Sokoine University of Agriculture, Tanzania
Center of Excellency in Water Infrastructure and Sustainable Energy (WISE)	Nelson Mandela African Institution of Science & Technology, Tanzania
Collaborating Centre for Research, Evidence Agricultural Advancement, Teaching Excellence and Sustainability (CREATES)	Nelson Mandela African Institution of Science & Technology, Tanzania
Establishment of and “East African Centre for Crop Improvement” at Makerere University	Makerere University, Uganda
Africa Centre for Agro-ecology and Livelihood Systems (ACALISE)	Uganda Martyr ’s University, Uganda
Pharm-Biotechnology and Traditional Medicine Centre (PHARM-TRAC)	Mbarara University of Science and Technology, Uganda
African Centre of Excellence for Materials, Product Development and Nano-Technology	Makerere University, Uganda
Center of excellence for Infectious Diseases of Humans and Animals	University of Zambia, Zambia
African Center of Excellence for Sustainable Mining	Cooperbelt University, Zambia

for identification and designing for implementation university-led and stakeholder/end-user relevant thematic research areas. The support to universities in Africa by the respective national Governments and development partners is evidence that the main actors in the development context see as priority the need to cultivate capacity of at universities to produce knowledge and increasingly incorporate knowledge generated into use. The several thematic areas highlighted in this paper represent a need for sustainable long-term beneficial contribution of knowledge to development. For this to manifest, Africa needs strong universities that are focused to building and/ or strengthening their research culture. In the knowledge economy/society, universities have become politically and economically more important as institutions that produce and transfer knowledge. While it is certainly so that many other institutions form an important part of any national innovation landscape, universities are the only specialized institutions whose core business is knowledge, both its production and its reproduction and dissemination, including the education of the next knowledgeable (suitably qualified) generation.

Acknowledgement

This paper is the authors' contribution to the 6th All Africa Higher Education Week & RUFORUM Biennial Conference held in October 2018 in Nairobi, Kenya. The data presented are synthesized from the RUFORUM Competitive Granting process and various convening events in the development of a continental university Research for Development Agenda. The authors duly acknowledge all participants, conveners and sponsors of these efforts and events. This paper is a contribution to the 6th African Higher Education Week and RUFORUM Biennial Conference held in October 2018 in Nairobi, Kenya

References

- Bloom, D., Canning, D. and Chan, K. 2006. Higher education and economic development in Africa. Washington DC, The World Bank.
- Cloete, N., Bailey, T., Pillay, P., Bunting, I. and Maassen, P. 2012. Universities and economic development in Africa. Centre for Higher Education Transformation (CHET), Somerset West, South Africa
- Carnoy, M., Castells, M., Cohen, S.S. and Cardoso, F.H. 1993. The new global economy in the information age: Reflections on our changing World. University Park, Pennsylvania State University Press.
- Nampala, P. 2017. Research on” vs “Research with” Communities: A critique on the importance of multidisciplinary and inter-disciplinary research teams with regard to uptake of innovations. *African Journal of Rural Development* 2 (3): i – iv.
- Nampala, P., Apio, J., Mkandawire, S., Osiru, M. and Adipala, E. 2016a. Building effective convening power for higher education in Africa. *RUFORUM Working Document Series* 14 (1): 313 – 325.
- Nampala, P., Egeru, A., Tusiime, G., Osiru, M., Uwituze, S. and Adipala, E. 2016b. Priority themes in the discourse on linking agricultural universities to industry and other stakeholders. *RUFORUM Working Document Series* 14 (1): i – xii.
- University World News (UWN). 2018. African Research Universities Alliance (ARUA) launched. Available from: <http://www.universityworldnews.com/article.php?story=20150310185922166>, Accessed: 19 June 2018.