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Silo Walls – from the front line
Imperatives for integratinglearning processes in postgraduate education

Abstract

As a lecturer and member of department in a local university in Kenya, I see first-hand how part of the problem of the decline of public universities in the country, can be attributed to the prevalence of the silo mentality when developing and deliveringacademic programmes. Despite the much-touted virtues of multidisciplinary approaches that create opportunities to collaborate, we still build these programmes to encourage deep learning in isolationfrom other subjects. We habituallyfall back on the now classic precolonial,intra-disciplinary modelwhichencourages the restriction ofscope of scholarly interaction to the people active in a particular discipline.

The problem is proliferated in higher education, by a copy and paste culture, in attempts to establish offshoot programmes in descendant institutions endowed with alumni from traditional universities.The result is university programmes are still delivered as disparate courses in independent standalone departments. We see pure scientists not ready to share their learning or work practises with social scientists and business faculty who are unenthusiastic about reworking their courses to better suit those delivered in the creativearts. This is the silo wall milieu at its most destructive. Because of this practise, sharing information across programmes happens through a cumbersome processes of servicing where one department services another on written request.This mode of

operation encourages departmentsto treat their programmes as intellectual property of their own bodies of knowledge.This practise compounds the problem by casting programme silo walls in concrete making them an impediment to collaborative and interdisciplinary approaches better suited to a world of scarcity. The result is departments find it easier to simply ignore market and societal demands to upscale programmes and dismiss calls to meet students' expectations.In the long term there is little or no foundational unity amongst programmes in higher education.The consequence is the erosion of the cohesion needed to build homogeneous communities of learners aligned to industry and community needs.

Against a historic background and general introduction discussingthe origins of the silo effect, this paper examines some key issues ininterdisciplinary postgraduate curriculum development. These key issues comprise philosophical foundations, content and methods, strengths and weaknesses.The central theme of this paper questions the value of erecting silos walls in academia, and conceives future curricula, as built up academic real estate without walls. The paper outlinesthe thinking that informed the adoption of an interdisciplinary method for a Master of Technology curriculum in Design and Interactive Media. The programmeis put togetherusing people-centredand industry-guidedstrategies targeting the leaners the Technical University of Kenya is trying to serve. The overarching aim is to develop new areas of focus by taking an interdisciplinary view of the whole curriculum. By recognizing the interconnections amongst objects of learning in related fields, then by synthesizing them into unified pathways,we aptly engender collaboration and

cooperation in education with a view to solving the complex nature of today's societal and industry problems.

To solve the myriad of issuesemerging from our increasingly knowledge-based local economies,every learning process needs to be eventually integrated.

Keywords: silo mentality, silo effect, interdisciplinary, multidisciplinary, intra-disciplinary, curriculum integration, integrate, Design, Interactive Media

A Background on Contextual Influences

The development of teacher education in Kenya today can be examined and reflected from a classical epoch, through the medieval, renaissance, agrarian, industrial, precolonial, colonial and postcolonial eras. (Omachar, 2016).

The basis of the curriculum of the mediæval monastic schools by the beginning of the eleventh century was the beginning of the essence of university education. The study of seven liberal arts, as the subjects taught was what were thought suitable for the development of intellectual and moral excellence. In the renaissance there was classical education based on the Latin language in universities. There was also education through apprenticeships for those who planned to pursue a trade. Both mediæval and renaissance higher education systemswere markedly different from what we are familiar.

The educational style that defines the way todays universities are organised, with the emphasis on orderly progression and the silos of individual subjects is largely the creation of the agrarian and industrial age. These systems were understood to have first emerged in Europe in the late 18th Century in the Victorian era in what were called public schools. The characteristics of this factory model typifythe basic and higher education systems of the mid to late 20th century. They comprise, top-down management, separation from the community, emphasis on behaviour and institutional management, centralized planning, standardization and outcomes designed to meet societal needs, and efficiency in producing results.

European education systems were radically reoriented during the course of the 18th century as part of the age of the Enlightenment. A more intellectual and philosophical approach to learning that laid emphasis on the scientific method, in favour of the more interpretivist methods that tended to favour more of creative thinking. These influences impacted on the colonial and postcolonial modern education curriculums.

In a comparative study of four African countries, Woolman (2001) explained how before and after independence, a number of African intellectuals engaged in critical evaluation of the goals and practice of education. Their thoughts regarded contemporary education as most effective when it integrated the values and strengths of traditional culture with the knowledge and skills required by modern life. With few exceptions, if any, traditional educational practices in precolonial African societies were predominantly utilitarian

(Adeyemi, Adeyinka, 2002). It was an imperative of colonial masters, to replace indigenous ways of learning with systems closely aligned to the values espoused in the West. The goal at the time was to indoctrinate rather than to educate through scholarly inquiry. This is the backstory of many of the content's educational systems.Cultures and societies are dynamic, not fixed in one posture (KTakayama, A Sriprakash, R Connell, 2016).Precolonial societies were not silos, but interacted with each other over long periods of time, absorbed outside influences, and had a shared existence.

In modern times we find subjects in curricula within our education systems sandwichedinside walled-garden silos.

An Introduction to the Cocktail of Disciplines

This paper will discuss the relevance of Design and Interactive Media studies in postgraduate education. By Design and Interactive Media studies, I refer to the new interdisciplinary field amongst Designers, Computer Scientists, and Cultural Anthropologists concerned with the collective and systematic execution of all three practices. Thisnew field has emerged as an extension from similar interests and problems in these respective disciplines. In Design, it was observed that the processes governing user interaction cannot be properly accounted for in terms of the frameworks of Design principles alone. Art and Sociology have traditionally contributed to the digital content creation and user experience analysis of Interactive media systems. More recently however, Mathematics, Psychology and Artificial Intelligence have also become interested in the processes underlying comprehension of interactive environments. Sociology has made a great contribution to the study

of the structures and strategies of social networks, whereas anthropology has a tradition of the study of myths, folktales, riddles and the interpretation of cultural paradigms.

Mass communication, a subject shared with social psychology, is crucially paying attention to processes of belief, opinion and attitude formation including change in communicative contexts. It involves the important analysis of audio, visual and audio-visual media in relation to social groups.

While, this cocktail of disciplines is by no means exhaustive.The meaningful practice and study of interactive media systems requires the subject areato draw from multiple disciplines to create a study path that give learners the requisite cognitive and practical knowledge to solve critical problems facing 21st century communities and organizations. To apply the study requires an understanding of the Design ideation and execution, scientific functionality and experimentation as well as user interaction and their communicative contexts.

In order to appreciate the specificity of constructs and concepts as they are studied more exclusively in theseconvergent disciplines, a more general understanding of interactive media systems is necessary. In this paper, then, I would like to discuss a number of points where such an approach can provide useful insights to higher education. I will limit myself to institutional education in technical universities. The paper systematically deconstructs the nature of the problem obstructing the development and implementation of interdisciplinary approaches to education and how such problems

influence learning processes. Secondly, the paper attempts to suggest probable solution to the acquisition of interdisciplinary knowledge and skills, through a systematic review of the philosophy, rationale, needs, justification and goals of a Masters in Technology curriculum for Design and Interactive Media. Finally, we will look at expectations and future impact of trans-disciplines in higher education.

Although I will assume that serious insight into the nature of a postgraduate trans-discipline study might provide some useful suggestions for applications in the higher educational practice in general, I do not want to claim it will solve important social and workplace problems right away. I would like to avoid such an overly optimistic approach. I only state that subjects are currently taught, predominantly in isolation of each other, or at best, with weak connections to one anotherestablished through cross-curricular collaboration. This is the silo structure that is pervasive in academia and was built for specialization and territorial ownership. These silo walls are thick and inhibit meaningful, innovative and relevant learning.

These views on interdependent and connected rather than as individual and isolated subjects and environments are proffered from the perspective of a practisingDesign and Interactive Media specialist interested in education, and not from the point of view of a professional educationist.

The Dual Nature of the Problem

The kind of education we need begins with the recognition that the crisis of global ecology [and human resource] is first and foremost a crisis of values, ideas, perspectives, and knowledge, which makes it a crisis of education, not one in education (Orr 1994, p. 5). Higher education in its presently constituted form, appears ill prepared to produce human resource capable of solving the complexity of problems we find today at industry and community level.The teaching aims of higher education, remainentrenchedin a silo mentality that resultsin a two-fold problem.The development of curriculums on one hand constrainslearning tocore subject areaswithin departments and on the other confines teachers and students to think along the narrow limitations of their fields.

Public universities in Kenya conventionally organise the frameworks of core knowledge and competencies according to levels of expertise as outlined in Bloom's taxonomy of educational objectives(Bloom et al., 1994; Gronlund, 1991; Krathwohl et al., 1956)comprising knowledge-based, skills-based, and affective goals. Thesecapabilitiesare taught within the silos of different subjects. These frameworksare studied and applied as specialized skillsets that draw from core subject areas.A closer look at the demands of an increasingly global society and workplace, would suggest otherwise. Addressing a gathering, Subramaniam Ramadorai, adviser to the Prime Minister of India, explained at a lecture, how today's jobs require interdisciplinary skills and businesses are realising that the best innovation happens not when a bunch of scientists come together but when people from business, science, [mathematics,] humanities, design and art come together (Ramadorai, 2016). The

same can be said of study programmes and departmentswhose courses can be best delivered through a cross fertilization or better still, integration with related subject material. There is a growing realisation within the African content, on the need to break down silo walls between subjects and programmes inhigher education.

There is a tendency for university faculty to suffer from what has been called “the silo effect,” which we define as the effect encompassing the larger human condition of the silo mentality, which includes a predisposition away from sharing information within an entity or with outside entities (Crow, 2009). This occurs when lecturers become isolated in their own little part of their academic neighbourhood and consequently experience minimal subject specific interaction with colleagues. Confined within silo walls, Africa’s institutions of higher education have struggled to keep pace with market demands to educate for tomorrow’s workforce, citizenry and life. Higher education curricula need to vigorously challenge students to critically appraise some of these emergent industry and societal realities:

i. The workplace is constrained with a scarcity of resources.
ii. The job market can assimilate all graduates from the education system.
iii. Technology will solve most of humanity’s problems.
iv. All individual and social needs can be met through financial and material means.
v. Individual success is separate from the well-being of communities, cultures, and environment.

Contributing factors to the problem

Several structural aspects of current institutional systems contribute to the problem. These include limited interactions amongst colleagues across academic boundaries, disparate curricula and educational strategies, lack of integrated technologies and dearth of policies for the most complex and interdependent issues with which society must deal. These issues obstruct sharing of information across disciplinary boundaries. Higher education has unique academic freedom and the critical mass and diversity of skills to develop new ideas, to comment on society and its challenges, and to engage in bold experimentation in sustainable knowledge practises. Local institutions however remain unenthusiasticabout risk and slow to change.Meadows (1997) suggested the most imperative change for institutional transformation is a deep seated cultural shift.

With few exception, this is the situation in which we find local academic institutions in today. At the heart of the issue is the reluctance to accept change as inevitable. Teaching staff seldom accept even the simplest and most obvious truth if it would oblige them to admit the falsity of conclusions which they have delighted in explaining to colleagues, which they have proudly taught others, and which they have woven, thread by thread, into the fabric of their lives (Bridges 2001, p. 17). The silos of higher education are organized into highly specialized areas of knowledge and traditional disciplines. Designing aninterdisciplinary learning environment requires a paradigm shift toward a systemic perspective emphasizing collaboration and cooperation. Much of departmental practices and teachings stress upon individual learning and

competition, resulting in professionals who are ill prepared for cooperative efforts. The result is learning that is fragmented, and facultyend up responding to the long-established attitudesthat pander to the whims of central management or become subservient to the demands of research.Operational influences and factors relating to course management, systematically disincentivise scholars from extending their work into other disciplines or inviting interdisciplinary collaboration.This impacts adversely on students who graduate with aningrained silo mentality and struggle later in delivering on the demands of the modern workplace.

The Walls Barricading Learning Programmes

The inability in higher education of public universities to adapt meaningfully to change, can be attributed in part to the prevalence of a silo mentality barricading departmental programmes. Built into these programmes are silo walls that encourage deep learning in isolation rather than addressing multidisciplinary problems and ideas in collaboration. Theydraw from a traditional precolonial, factory educationalmodel.

There exists an observablecopy and paste mind-set from University of Nairobi (UoN) or Kenyatta University (KU) to establishing new programmes. Descendant institutions of higher learning, endowed with alumni from UoN and KU, in an attempt to establish offshoot programmes, copied their strategies, structures, and programme methods – structures, which are themselves a carryover from colonial times. It works in well-funded environments that don't facethe constraints of scarcity that are the reality most universities find themselves in today.

University programmes tend to be delivered as disparate courses in independent departments. We see pure scientists not ready to share their learning or work practises with social scientists and business faculty who are ill prepared to rework their courses in line with those delivered by faculty in the creative arts. This is the silo effect at its most destructive. Because of this mentality individual disciplinestend to treat their body of knowledge as their own intellectual property. Sharing information across programmes happens through cumbersome processes of cross fertilisation where one department services another and on written request.This model reinforces the walls of programme silos and becomes an impediment to collaborative and interdisciplinary approaches better suited to a world of scarcity. The result is departments find it easier to simply ignore market demands to upscale programmes and dismiss calls to meet students' expectations. In the long term there is little or no foundational unity across departmental programmes. The consequence is the erosion of the cohesion needed to build homogeneous communities of learners aligned to industry.

Trends Dramatically Changing Work And Workplaces

Imagine someone going to sleep in 1960 and waking up to a work day in 2018. How different would their work life be today, compared to what it was back then? Trends dramatically changing work and workplaces include,the prevalent distribution of organizations, the widespread availability of social collaboration technologies, the shortage of knowledge workers, the demand for more work flexibility and pressure for more sustainable workstyles. These trends call for workplaces that are not shackled within disciplinary

constraints but rather, are spontaneous, dynamic and multiplicit. Industry further demands that students are prepared for current and unimagined economic, social and technological challenges at places of work.

To meet market demands and students' expectations, it is necessary to implement learning processes grounded in industry-focused curricula and centred on design systems that respond to social needs and appropriate technology. Such a study should engage students in an environment of rich and contrasting cultural perspectives, multiple intellectual disciplines and diverse learning styles. To meet the complex needs of the workplace, it helps when approaches to learning are participatory and delivered in settings where lateral thinking is rewarded, collaboration is celebrated, and failure is understood to be an essential to success. To remain relevant, higher education programmes must increasingly harness knowledge from a cocktail of related disciplines with the goal of addressing social needs and improving livelihoods.

The need for multidisciplinary programmes, has been in the domain of academic discourse for some time now. And there exists sizeable consensus for change. The discussion needs to shift to examine the practical toolsetto providing faculty with a clear passage to accomplishing the goal of partial or complete dissolution of academic silo walls.

The Hero

There is a growing consensus that new approaches to curriculum development must accommodate the characteristics of today's

students, bemore inclusive and address twenty-first century interdisciplinary themes (Carneiro, 2007).
Perkins endorses the practise of teaching of ‘thinking skills’ as a “meta-curriculum” interwoven with traditional core subjects’. Tucker and Codding of the US-based National Center on Education and the Economy (1998) encourage the adoption of a thinking curriculum (Scott, 2015, p. 3). They emphasise both an in-depth approach to knowledge acquisition in the subject area coupled with an ability to apply understanding to solve complex, real-world problems that students would face in the workplace and life.

The common features of these models highlight are the building of core knowledge and skills through multidisciplinary approaches. A curriculum based on these learning methods blended with more direct forms of sharing across fields is necessary to adequately arm students with the right capacity.

Building new programmes by integrating two or more fields seems a logical next step.

This paper reviews one approach to building courses without silos. It examines the thinking that informed the adoption of interdisciplinary methods for a Master’sdegree programme in Design and Interactive Media. The programmes syllabus is put together using purposive strategies targeting a people-centred, technology-driven, local Kenyan market the department of Design and Creative Media at the Technical University of Kenya is trying to serve. The overarching aim is to develop new areas of focus by taking a multilateral view of the whole curriculum. The programme is

constituted along the lines of an academic multilateralism in which an alliance between the Design and Computer Science departments alongside the study of cultural Anthropology is formed to advance common goals. Integrating these subjects gives students the opportunity to learn from even broader spectrums thus developing deeper perceptions of knowledge.The importance of interdepartmental and inter-subject communication is strongly encouraged amongst lecturers to engender collaboration and teamwork with a view to accomplishing the programme's goal of industry inclusivity.Structured in this way, the programme is better able to focus on practical application that meets the demands of the regional and global design industry. At the same time, a more diverse learning environment well positioned to embrace dynamic learning approaches that meet individual student needs. This affords students' realisticinsights into the rationale behind the problem solving process.

The Super Hero

What makes the MTDIM programme uniquely placed to educate learners to solve problems is that they are taught and encouraged to demonstrate capacity for deploying ideas in real-life, multidisciplinary situations of varying degrees of complexity.Teaching modes include seminars, roundtable round table discussions and workshop production, are geared toward raising conceptual understanding and practical application of technology across the social and pure sciences as well as the arts.

Industry demands that students are prepared for current and unimagined economic, social and technological challenges in the workplace. There is therefore a need to give students at

postgraduate level, the opportunity to participate in research and to work collaboratively on practical projects and problems while developing true mastery of knowledge. A contextual learning approach enables students to understand early on the societal impact of the discipline and what it means to be a Designer. This educational requirement needs close collaboration with industry practitioners on developing innovative curricula, flexible programming methods, open standards and new tools to advance the field.

How students learn matters to employers because it shapes how they think and what they do at work. The masters programme incorporates collaborative, experiential learning styles into its courses. This way core curricula can be implemented to produce graduates who can think for themselves and integrate into fast-paced work environments.

The programme considers the Design of both the product and the assembly system that will be used in production and implementation. The study seeks to build competencies in constructing the processes that emerge when deploying artefacts and digital archetypes for market consumption. It presents opportunities for anyone desiring to undertake a graduate education by studio or field research project. The study provides opportunities for students to enter industry directly or to advance to the doctorate of technology study level.

The programme also provides openings for tailor-made studies, especially in fields such as engineering, culture, development and

education which are essential but, to date, are outside the well-travelled paths of the Design practise. The Master of Technology in Design and Interactive Media takes into account the academic rigour that is predicated on applied research, to extend boundaries of knowledge, and address unmet needs. It strives to address local, national, regional and international challenges while laying emphasis on the interdisciplinary, collaborative concerns for the disadvantaged as well as the national development goals.

What the battle will look like

What if higher education were to take a leadership role, as it did in the space race and the war on cancer, in preparing students and providing the information and knowledge to achieve a just and sustainable society? What would higher education look like? The education of all professionals would reflect a new approach to learning and practice. A college or university would operate as a fully integrated community that models social and environmental sustainability itself and in its interdependence with the local, regional, and global communities. In many cases, we think of teaching, research, operations, and relations with local communities as separate activities; they are not (see figure 1). Because students learn from everything around them, these activities form a complex web of experience and learning. All parts of the university system are critical to achieving a transformative change that can only occur by connectinghead, heart, and hand. “However well-intentioned, formal education cannot compete with the larger educational effects of highways, shopping malls, supermarkets, urban sprawl, factory farms, agribusiness, huge utilities, multinational corporations,

television and non-stop advertising that teaches dominance, speed, accumulation and self-indulgent individualism" (Orr 2002, p. 31).

Expectations and planning for the future

To graduate students who can overcome this larger, pervasive form of learning, the educational experience of graduates must reflect an intimate connection among curriculum and (1) research; (2) understanding and reducing any negative ecological and social footprint of the institution; and (3) working to improve local and regional communities so that they are healthier, more socially vibrant and stable, economically secure, and environmentally sustainable. Just imagine if, in this millennium, the educational experience of all students were aligned with the principles of sustainability. To achieve this, the content of learning will require interdisciplinary systems thinking, dynamics, and analysis for all majors, disciplines, and professional degrees. This kind of thinking is critical to addressing environmentally sustainable action on local, regional, and global proportions over short, medium, and intergenerational time scales. Education would have the same "lateral rigor" across, as the "vertical rigor" within, each discipline. Compartmentalized knowledge without connection to larger system interactions results in viewing many interdependent challenges as separate, hierarchical, andcompetitive. The net results are often unintended narrow, ineffective solutions, or worse, can be harmful to our communities and environment over time.

The content of education will include ways to preserve and restore cultural and biological diversity, both of which are critical to a sustainable future. This will mean learning how to live off nature's

interest, not its capital (e.g., practicing sustainable agriculture, fishing, forestry). The context of learning will change to make human/environment interdependence, values, and ethics a seamless and central part of teaching of all the disciplines, rather than isolated as a special course or module in programs for specialists. All students will understand that we are an integral part of nature. They will understand the ecological services that are critical for human existence and how to make the ecological and social footprint of human activity visible and as benign as possible (Chambers, Simmons, and Wackernagel 2000; Ryan and Durning 1997). Environmental specialists are necessary but not sufficient. Understanding how to create a just and sustainable society must be a fundamental principle in all education.

The process of education will emphasize active, experiential, inquiry-based learning and real-world problem solving on the campus and in the larger community. It is widely known that for long-term retention of knowledge, skills, and values, we retain 80 percent of what we do and only 10 to 20 percent of what we hear or read. For example, as part of the curriculum, the learning experience for students would include working on actual, real-world problems facing their campus, community, government, and industry. The process would also increase group work and learning so graduates will be able to collaborate effectively on complex problems as future managers and leaders.

Finally, the learning and benefit to society of higher education forming partnerships with local and regional communities to help make them socially vibrant, economically secure, and

environmentally sustainable will be a crucial part of successful higher education. Colleges and universities have an obligation to support local and regional communities, making every action lead to community improvement. Higher education institutions are anchor institutions for economic development in most of their communities, especially now that the private sector moves facilities, capital, and jobs frequently as mergers, acquisitions, and globalization become the norm for corporations.

A well developed curriculum should be timeless, able to supporting learners beyond the university context, guarantee mobility between contexts and throughout an individual's entire work life. Existing curricula should be restructured to make them capable of adapting to the time incorporating new methods, tools and process from related subject areas.

Call for action

The issue is not the ability of higher education to take on this challenge; it is the will and the time frame for doing so. Most of the world's major international governmental, scientific, and nongovernmental institutions, as well as many business organizations, agree that the changes needed in individual and collective values and action must occur within the next one to two decades. After all, a child in kindergarten today will graduate from college in 2020. If higher education does not lead the sustainability effort in society, who will?

Albert Einstein, purported to have said, “The significant problems we facecannot be solved at the same level of thinking we usedwhen we created them” (Calaprice 2000, p. 317).

The most successful changes are those in which the formal curriculum is an integral part of the other three functions of higher education. Most are driven by faculty and student pressure, but an increasing number should be driven by academic administrators and management:

i. Environmental and sustainability literacy.

ii. Curriculum incorporating environmentally sustainable design on campuses.

iii. Curriculum involving improvement in local communities.

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