



Interdisciplinary Collaboration That Works: Information Technology and Social Sciences

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Introduction

The aim of this paper is to contribute to knowledge around the intersection of technology trends and Social Sciences a broad remit, with multiple layers and multiple branches. The authors approach this subject by arguing that if the purpose of technology is to benefit society, then technology trends and solutions must be examined through a societal lens. We suggest that developments and trends in IT should not be considered as a stand-alone specialized discipline overseen by the IT world, but instead should stand side by side with the Social Sciences in order to fully meet society, and harness the human, societal and cultural perspective. Alongside this convergence of Social Science and IT, another factor to consider is the context: in this institution English is the medium of instruction with students whose first language is Arabic. As many Social Sciences and IT courses are considered content areas, language needs are rarely factored into curriculum planning, however, it would be remiss to ignore the language needs of students in these classes, where concepts often have to be broken down, and unpacked, and vocabulary has to be discretely taught. Research shows that content area teachers are seldom English language trained (Hu, 2019), particularly in the sciences, therefore bolstering the argument for this type of interdisciplinary collaboration.

The authors come from two distinct academic backgrounds which rarely intersect: one is a CIS faculty member who has taught a variety of programming courses. The other has taught an array of English and Social Science subjects from Intercultural Intelligence to Critical Thinking to Future Foresight. This provides the range of skills that students need: both technical, across a broad suite of competencies and English language. In a complex, rapidly changing world where society is faced with unprecedented issues, multiple perspectives across a range of fields is needed (Casson et al., 2018). This bridges the disconnect between ensuring students not only develop the technical skills, but also the capacity for them to implement those skills, thus providing an effective solution on how to more successfully adopt technology trends for the benefit and development of society.



Why the Collaboration?

First, we know why developing IT skills matters for our students; we need to prepare them for a world where they will have careers in, or simply interact with, growing trends such as cloud computing and AI, and where the fear of security threats will take over the fear of ‘old world’ physical crimes. In this ‘new world’ these young men and women will, and do, to some extent now, engage seamlessly with digital domains and connected technology. Characterized by unpredictability and volatility, we have only one certainty: all our lives can anticipate change at a rate never seen before (Xu et al., 2018). We would be hard pressed to find anyone who can argue against the need for IT in any institution’s curriculum and the increasing demand for quality IT practitioners in education. However, IT matters not just for the technical expertise, but importantly because it impacts the way we live socially. Technology is not ‘neutral’, intentionally or not it shapes cultural and political systems, societal values and individual behavior and ways of thinking (MacKenzie & Wajcman, 1999). It stands to reason then that social scientists come to this conversation as purveyors of societal knowledge, in order to utilize the strengths that IT brings and to mitigate the potential damage. English language teachers also matter here as none of this rich content is accessible, particularly where English is not the first language, without English language teachers providing this bridge to meaning.

This societal knowledge is why the Social Sciences matter and this is why collaboration between IT and Social Sciences is important. To illustrate, let’s look at the example of YouTube, initially designed from a technological determinism outlook to be an online video-sharing website and nothing more (Hagerty & Rubinov, 2019). The exponential growth came about as this evolved, naturally growing in popularity as YouTubers gained celebrity status, and YouTube became the ‘go to’ place for information sourcing. The social scientist, and social constructivism standpoint could explain and anticipate this growth as reflecting the changes in society where notions of careers are shifting, personal input is valued, and trends in both the economy and information sourcing are moving to ideas around shared resources, versus exclusive ownership (Moy, 2016). By working together, the IT educator and social scientist can both develop the technical expertise needed and explain and anticipate needs and trends bringing together skills that complement each other. Social science is able to look broadly and examine phenomena, perspectives and experiences, whereas natural sciences, under which the IT industry falls examines small issues in-depth, in quantitatively based research (Fischer et al., 2011). This collaboration gives us a fuller understanding and our epistemological differences allow us to better serve society. A fact that industry has more recently cottoned onto evidenced in the increasing number of social science graduates being hired in tech companies: “... tech companies are interested in things like community, identity, political polarization and ‘fake news,’ and they realize that social scientists are more likely to be exposed to the most important research coming out about topics like these” (Hovis, 2018, para 2).

Another example to illustrate the beneficial nature of the IT and Social Sciences partnership can be seen through the development of Artificial Intelligence (AI). AI is entrenched in social and cultural factors that cannot be ignored and from which issues emerge that cannot be successfully addressed by the IT industry alone. Perceptions of AI across the globe are overwhelmingly shaped by societal and cultural factors, and it is here that the social shaping of technology is most notably evident. Movies, music, cultural history and the social world all work together to shape AI and technological developments, for example, Martin Cooper ‘imagined’ the first cell phones after watching a star trek episode (Doarn, 2021). An interesting article by Joi Ito (2018) entitled: *Why Westerners Fear Robots and the Japanese Do Not*, unpacks the cultural, historical, spiritual and societal traditions and beliefs that shape our thinking around AI and robotics. Japan is a culture and society steeped in Shintoism where all things animate or inanimate contain life force or spirit: “Nature doesn’t belong to us, we belong to Nature, and spirits live in everything, including rocks, tools, homes, and even empty spaces” (Ito, 2018). From this worldview we can understand the Japanese early adoption and acceptance of robotics and AI and the intrinsic nature of AI as being good. Conversely, AI in the western world has been somewhat demonized by movies like the Terminator developing cultural imaginations that portrays robotics as killers bent on destroying us

(Hagerty & Rubinov, 2019). From this comes an unease and caution around AI that permeates western thinking and presents a kind of unconscious bias.

These cultural stories, traditions and ethical standpoints are the domain of the social scientist, but coming together with the IT industry these can be used to inform the imagination of technology developers, so that AI technologies support people to flourish around the world.

Collaboration between IT and the Social Sciences in Education

So far the examples used above have illustrated how IT and Social Science can work together in industry - to some extent this is the end game for most graduates. However, if this collaboration can happen in industry, imagine if this was introduced in the educational curriculum? Imagine if students went to industry already with not only the technical expertise needed to perform their duties but an awareness of the social, cultural, and ethical factors that interplay with this technology? While students may learn Social Sciences subjects such as Future Thinking and Cultural Intelligence, alongside their technical skills such as Coding, these courses are taught discretely and there is somewhat of a disconnect between them. This is why collaboration between these two fields is important, as this partnership bridges the gap.

Faculty at Rensselaer Polytechnic institute, America's oldest technological research university, have had some success in working towards connecting these two fields more closely so that knowledge from each informs the other. Here IT core courses work together with social sciences to develop critical thinking skills and explore how IT traverses society, government, ethics and culture (Spooner, 2000).

An aptly named article by Baty (2021) from Times Higher Education: *Why the Arts and Humanities are Critical to the Future of Tech*, outlines why the IT and Social Sciences alliance is crucial to the future of education. Key arguments include planning for the human element in AI; the urgent need for critical thinking across technological developments; and a recognition that the most powerful source of knowledge is by tapping into the mutual relationship between science, engineering and humanities.

Interestingly, the 2022 edition of the Times Higher Education World University Rankings for arts and humanities rank Stanford University and Massachusetts Institute of Technology (MIT) as first and second place holders. The fact these two giant educational empires of the tech world have embraced the social sciences shows that they recognize the enormous value of humanities to society and in understanding the best ways to utilize this technology (Baty, 2021).

Collaboration Example: Drone Training

In this paper so far, the authors have demonstrated the mutually beneficial relationship between IT and the Social Sciences in both industry and education. The focus now shifts to their home soil and local context of the United Arab Emirates, in describing a collaborative research project planned between CIS (Computer Information Science) and General Studies faculty at Dubai Women's College, part of the Higher Colleges of Technology (HCT) system. It aims to provide a practical, working model to address the issue of how to support students in their entrepreneurial endeavors and subsequently to achieve the institutions' vision of graduating companies. Importantly it serves as an example of what can be achieved with the collaboration of IT and Social Sciences. The learning is focused around training in drone technology.

Why drone technology? The use of drone technology is developing at an unprecedented rate globally with the application potential impacting every sector. As an emerging trend on a rapid upwards growth trajectory, it is essential that students are skilled in this technology in order to participate in a world whereby drone usage will be an established accomplished reality. The need to provide UAE nationals with training in mega trends such as Robotics and AI which drive Drone technology clearly aligns with the UAE's development, strategic foresight and government priorities (MoCA, 2022). This interdisciplinary collaboration examines how the Higher Colleges of Technology can successfully

develop innovation, and graduate companies leveraging this new technology to support both the development of the country and to compete on the world stage.

This approach is unique in two ways. Firstly, it involves taking students out of the classroom and training them in drone technology and operation through a collaboration with SANAD drone certification academy in Dubai (<https://www.sanadacademy.ae/>). Typically, HCT students respond well to hands on, practical learning, providing students with inspiration to more fully explore the potential of drones. Secondly, along with providing hard skills-based training, this research also delivers the equally important innovation and future foresight skills, instilling the confidence and broadening students' vision necessary for success. This is where the magic of collaboration unfolds and it is in this space where social science and IT intersect to ensure that students have a full tool kit of skills and competencies to draw from in order to:

- Provide training opportunities for upskilling
- Develop entrepreneurship
- Produce technical leaders
- Graduate hi-tech companies

In this classroom example, Social Science students are first exposed to readings and discussion around drone technology to stimulate their curiosity and increase their overall knowledge. Society at large is also examined here, considering human values, beliefs, and preferences that could propel this technology. From this, students springboard into imagining both positive and negative future scenarios through the technique of asking numerous 'what if' questions. Specific examples generated might be around privacy issues as a negative, and the increased accessibility to remote regions as a positive. This societal information is then shared with Information Technology students who have to consider innovative IT solutions in order to successfully manifest these ideas into reality. For example, access to remote regions requires endurance, and the capability for long flight which current drone batteries do not support. Civil rights issues around privacy, which are interestingly heightened for women (Rice, 2022), presents IT students with an opportunity to consider how IT can be developed to protect people. This in turn may lead to an examination of the uses of blockchain technology to solve security issues. In a world that is rapidly changing, the beauty and power of merging social with tech is that it allows us to anticipate, plan for and therefore mitigate these unforeseen complications in an authentic real-world context.

The Role of Education in Drone Training

It is a given that the purpose of education is to provide graduates equipped to fill industry demands, therefore with drone technology emerging as a mega trend it is vital that graduates are prepared to either meet the employment needs of companies or to meet the needs of the world at large through their own startups. Universities and educational institutions around the world are currently taking up this challenge with twenty-one Drone Technology degree courses running in the U.S alone (Hopkinson & James, 2010), and fifty worldwide (Al-Tahir, 2015).

This is the rationale behind providing an educational model in this research study that is based on both developing students' hard practical skills such as drone usage, and soft skills such as future thinking, critical thinking and cultural awareness.

This approach is becoming more widespread globally, particularly in China which is leading in developing innovation in preparation for the Fourth Industrial Revolution. Shanghai Tech is a model institute for this type of collaboration, through the work of Dean Kelley as director of the Dean of the School of Entrepreneurship and Management, who says "the ultimate goal of our course is ambitious, that is, to plant an innovation or entrepreneurial seed in these science and engineering students among whom some might become leaders, entrepreneurs, policymakers", (Gleason, 2018, p. 100). This is exactly the kind of approach that this collaboration serves to replicate as it presents an educational framework based

on the merging of both social sciences and engineering to ensure students have the necessary skills and attributes for success.

The potential for this merging of disciplines is evidenced when examining the recommended sequence of study for Information Technology students at the authors' institution. From their very first semester students are exposed to relevant Social Sciences based courses, such as the Life and Future Skills course, alongside their IT courses. This particular Life and Future Skills course asks students to begin to examine the world through the lens of a future thinker; to notice trends, anticipate opportunities and challenges, and to consider a number of possible future scenarios. This is taught, at the same time, although distinctly, from students' core IT courses such as Web Technologies yet students rarely see the connection between the two and how each course can inform the other. The solution to this, as this paper argues, is through purposeful collaboration.

Recommendations

With the increasing popularity of such trends as the metaverse (a 3D network of virtual worlds focused on social interaction), we can see the delicate dance between technology and social sciences where; even in this nonphysical world societal issues of equality, inclusion and interculturality are considered and planned for (Baty, 2021). This planning requires careful consideration of choices which inevitably create a character within the technology. The inclusion of social sciences, and attention to the social shaping of technology can help 'steer' this giant technology ship down paths that more accurately reflect the values and desires of society so that society can truly benefit (Lowe et al., 2013).

We pose the question that if collaboration between IT and social sciences is recognized in industry, then perhaps this alliance should start earlier and be introduced in tertiary institutions. Research demonstrates that even prestigious, tech-based universities are now starting to bring together these two distinct fields with enormous success. However, more of this is needed; particularly in the authors' institute, it is fitting then, in the United Arab Emirates, a country renowned for its cutting edge, pioneering spirit, that this collaboration is taking place.

This collaboration is significant not only because it equips graduates with a greater capacity for employability and entrepreneurship but also because, importantly, it fills a gap in the knowledge in the field of research. Academia has observed a noticeable upward trend in interdisciplinary collaboration over the last 20 years, however this trend has focused largely on the medical field's collaboration with basic sciences and the interdisciplinary partnership between engineering and basic sciences (Weston et al., 2020). There is a significant dearth of research on interdisciplinary collaboration between Information Technology and Social Sciences, a natural partnership perfectly equipped to explore the world's increasingly complex issues (Barthel & Seidl, 2017). There are numerous reasons to explain this; one being that tertiary institutions are often locked into mental paradigms of 'departments' and 'them and us' mentalities. The authors argue for more fluidity, and for these literal and figurative walls to come down so that we can all; students, faculty and stakeholders, benefit from the expertise to be gained from other disciplines and grow both in our knowledge and as a society (Sylvan & Martin, 1997). A Guardian educational supplement article fittingly titled: *The University of the Future will be Interdisciplinary* encapsulates this ethos by saying: "Departments make it harder for academics to push boundaries as they struggle to find new intellectual homes for ideas that don't fit neatly into disciplinary boxes" (Irani, 2018, para 3). This collaboration is also becoming increasingly important from an English language teaching perspective, as underpinning all collaboration in an EMI context is the need to address and plan for students' English language needs. The adoption of a content and language integrated learning (CLIL) approach fills this need to some extent as the focus is on acquiring two skills at once: both content and language (Chien, 2020).

This paper has provided evidence for the benefits of both the theoretical and practical collaboration between Information Technology and Social Sciences in education and subsequently in the workplace. Moving forward, collaboration post COVID is now able to take a more practical hands-on approach.

Recommendations for moving forward include applying more collaborative ventures that draw on the strengths of both IT and Social Sciences disciplines. For example, student collaboration involving students of both disciplines working together systematically in combining their expertise on college projects. Of particular importance in the United Arab Emirates are identity issues, this social aspect could be combined with that of Artificial Intelligence developed into a more in-depth study examining identity within the confines of an AI environment.

We close with a quote by philosopher Martha Nussbaum, replace ‘Business leaders’ with technology developers and the same message applies:

“Business leaders love the humanities because they know that to innovate you need more than rote knowledge. You need a trained imagination” (Jacob, 2022, para 4).

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