

Fostering Interdisciplinary Research Culture, Challenges and Way Forward: The Universiti Malaya Experience

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ABSTRACT

Interdisciplinary research (IDR) exploring beyond the purview of a single discipline is critical for providing the requisite solutions to real-world issues. Furthermore, the process of translating research that could have a positive impact on and benefit the government, industry and society, typically requires a multipronged approach with inputs and solutions integrated from various disciplines. Therefore, IDR is vital in pushing the different disciplines forward and accelerating scientific discovery in innovative ways. Nonetheless, the move towards encouraging researchers to break away from working in silos to working together has been an extremely challenging task. Doubtlessly, interdisciplinary programmes demand much more involvement and exhaustive effort from researchers per se as they require not only academic scholarship but also soft skills to communicate, network and engage with other researchers from diversified disciplines, various stakeholders and beneficiaries. In addition to that, good leadership and all-rounded teamwork support are required in navigating and ensuring the success of the research programme to deliver its intended outcome and impact. In light of this, this opinion paper discusses some of the challenges confronted in fostering IDR at the Universiti Malaya and suggestions on approaches that could be adopted to garner the interest and move it forward.

Keywords: Interdisciplinary; Research; Challenges; Way Forward

1. Introduction

The complexity of the current global situation, such as the Covid-19 pandemic, persistent contamination of the environment and morbid concerns regarding health and well-being, is a wake-up call for researchers to move beyond the confinement of single disciplinary research in their endeavours to find solutions to the existing real-world problems. Moreover, the influence of global megatrends, such as Sustainable Development Goals (SDG) and Industrial Revolution 4.0 (IR4.0), have made it pertinent for researchers to work in collaboration with each other. Furthermore, in line with Malaysia's national agenda to become a fully developed country status and Shared Prosperity Vision 2030 (Prime Minister's

Office of Malaysia, 2019), experts from a wide array of disciplines would have to work together using interdisciplinary research (IDR) approaches to solve the grand challenges facing our Malaysian society and towards achieving real-world impact.

The effort to define 'interdisciplinary research and teaching' was deliberated as early as the 1970s in the Organisation for Economic Co-operation and Development (OECD) meeting held in Nice, France. It was then agreed that the definition of 'interdisciplinarity' refers to the 'Interaction between disciplines and it points to the presence of a team of discipline-based academics and emphasizes applications to real-world problems' (Berger, 1972). The modern concept of interdisciplinarity has been modelled to foster and encourage ideas for unity and knowledge synthesis, the emergence of organised programmes in research and education, and the broadening of traditional disciplines (Klein, 1990). The current definition of interdisciplinarity adopted by the National Science Foundation in their criteria and selection of awarding grants is based on:

Interdisciplinary research can be defined as a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice (National Academy of Science, 2004).

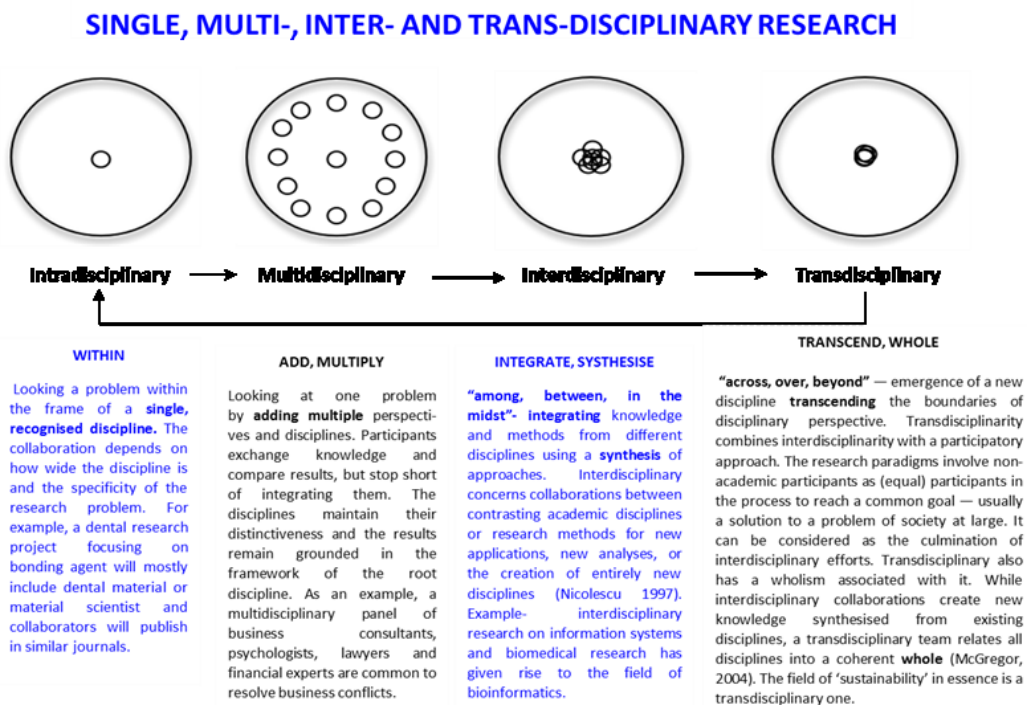


Figure 1: Illustration of a simple elaboration of the features of the various disciplinary levels of IDR, from single discipline to multi-, inter-, transdisciplinary (MIT) research (Jensenius, 2012), (Mcgregor, 2004) and (Nicolescu, 1997).

The definitions of interdisciplinarity have evolved in the last several years; however, the fundamental principles are still the same, and most of them are underpinned on a problem-focused approach. Furthermore, the definition now underlines the actual integration of various disciplines rather than their mere interactions. Another crucial feature that is emphasised is the communication between discipline-based academics undertaking interdisciplinary programmes. The complexity of IDR and its different modalities comprising MIT approaches that could be undertaken have invariably created confusion among researchers and have been constantly discussed. Although a consensus is not always attained for these approaches, it is clear that MIT research areas are dynamic, wherein they are continually emerging, amalgamating and transforming. Some of the terminologies and keywords usually used in describing the different levels of integration of MIT research are encapsulated in Table 1.

Table 1: The Terminologies and Keywords Describing the Different Levels of Integration of MIT Research

Terminology	Description
Discipline	a specific body of teachable knowledge with its own background of education, training, procedures, methods and content areas keywords: specialising, concentrating, analysing, segmenting
Multidisciplinary	juxtaposition of various disciplines, sometimes with no apparent connection between them keywords: sequencing, juxtaposing, coordinating
Interdisciplinary	the interaction among two or more different disciplines. Keywords: interacting, linking, blending, integrating, synthesising
Transdisciplinary	establishing a common system of axioms for a set of disciplines. Keywords: transcending, overarching, transforming, transgressing

Note: Adapted and incorporated from (i) "Interdisciplinarity: Problems of Teaching and Research in Universities," by G. Berger, 1972, and (ii) "Interdisciplinarity and Transdisciplinarity: Keyword Meanings for Collaboration Science and Translational Medicine," by J.T. Klein, 2014, *Journal of Translational Medicine and Epidemiology*, 2(2), p. 1024.

With more national and international granting bodies moving towards interdisciplinary projects in their call for proposals to resolve real-world issues, researchers must integrate the research questions and concepts in the said IDR proposal. Our researchers also need to embrace the salient characteristics of IDR by being open to interact and practise the art of networking. Adequate communication and soft skills are a bonus in forming an interdisciplinary team as members may not only be limited to counterparts from various disciplines but with collaborators worldwide with different cultures and mindsets.

This opinion paper essentially discusses some of the challenges encountered in fostering IDR, drawn from the experience of the Universiti Malaya (UM). It also includes challenges as well as the recommendations on approaches that could be adopted at different levels of entities to move IDR forward according to interview sessions and Focus Group Discussions (FGD) (Normaniza et al., 2020).

2. Interdisciplinary Research: The Universiti Malaya Experience

The initiatives put towards establishing of research management units, the formalisation of governance structure and the creating of a myriad of research grant schemes are principal drivers stimulating research and development at UM. Considering the influence of global issues on research and the country's journey towards the status of a fully developed nation, UM also acknowledges that important research ideas may go beyond the scope of a single discipline. Therefore, IDR is vital in pushing the different disciplines forward and accelerating scientific discovery in innovative ways. UM has also undertaken initiatives to support multidisciplinary projects by establishing specific internal grants and furnishing the requisite facilities for productive IDR.

Among the early funding mechanisms dedicated to bringing together research activities from different disciplines coordinated by UM's Research Cluster Office were the grant award scheme known as Universiti Malaya Research Grant (UMRG) Programme and the Grand Challenge (GC). The former was started in 2012 and it is a three-year (36 months) research programme led by a programme leader with two or more sub-programme leaders in different areas or disciplines. UMRG Programme aims at fostering MIT research and at the same time encourage the generation of new ideas, theories, concepts or processes that promote the generation of knowledge, innovation and new findings. This grant is also open to researchers who are interested in conducting research in groups to promote multi-/interdisciplinary research (Pejabat Kluster Penyelidikan, 2017).

The GC, on the other hand, is a long-term research programme that aims to enhance community and research leadership in accordance with the principles of social responsibility. It was introduced in 2013 with specific challenge-oriented research and development themes. Five themes were outlined in the GC call for proposals that include active ageing, eco-resilient cities, sustainable resources and technology, world without conflict and pushing economic borders (Pejabat Kluster Penyelidikan, 2017). Compared with the UMRG Programme, the GC is offered for a longer duration of 24–60 months. The programmes considered are those that are cutting across research domains and are transdisciplinary in nature. At the application stage, the research team is required to produce a concept paper, and the outline of the entire programme must demonstrate the interconnection between every sub-Grand Challenge involved. The programme is evaluated on the basis of the potential of its noteworthy contribution to society and the inclusion of stakeholders.

Subsequently in 2019, as a step to further boost and support the accomplishment, expertise and commitment of IDR in UM, a new grant award scheme, the Impact-Oriented Interdisciplinary Research Grant Programme (IIRG) was introduced. The grant given is for two-year programme, and the allocation is regarded as seed funding for the researchers to initiate their project. The specific objectives of the IIRG are to strengthen niche areas and nurture emerging thrust areas in UM, encourage IDR among UM researchers and drive impact-oriented research within UM (Research Cluster Office, 2019). The UM IIRG was launched to gradually transform the research culture within UM to a more integrated interdisciplinary approach. In doing so, it is anticipated to lead towards the ultimate goal of meeting the nation's expectations by addressing real-world issues pertinent to the society and industry. To encapsulate this idea, the elements of impact benefitting society, health, economic, cultural and

environmental are emphasised, and engagement with relevant stakeholders must be incorporated into IIRG proposals.

Contrary to other grants (UMRG and GC), apart from the academic output, the IIRG programme's deliverables also consider forms of non-academic output, such as writing media articles and organising forums or seminars as means of bridging the researcher with the public. Another requirement of IIRG is that the awarded recipients must apply for an external grant to encourage researchers to expand the purview of their research and sustainability of the project. This grant is perceived as highly competitive. The selection process is stringent with two levels of evaluation, and researchers are challenged to pitch their proposals to the panels and stakeholders before being successfully awarded the grant.

In contrast to UMRG and GC programmes where the team takes off their project on their own after being awarded the grant, a coordinated guided approach is undertaken for IIRG. A number of workshops are designed by the Research Cluster Office in providing an integrated overview of interdisciplinary concepts to the researchers embarking on IIRG programmes, in order to gradually transform the research culture within UM. These workshops are expected to provide casual avenues for interactions amongst the different background researchers while they work in collaboration with each other to develop their programme's impact pathway, enhance research communication skills and construct meaningful lay and graphical abstract for the understanding of the general public.

3. Challenges confronted by IDR

Although the initiatives and avenues to support IDR have been taken and provided for more than a decade, either at national or university level, the IDR approach in conducting research is still considered to be a challenge in many aspects. In addition, from our interview session and FGD, we discovered that a number of studies that were carried out were loosely clustered according to the various disciplines in the faculty and crossed faculty research was observed lacking (Normaniza et al., 2020). Apart from that, other noticeable challenges of carrying out IDR, *inter alia*, were as follows:

- i. Concept and IDR approach are ambiguous
 - The definition and concept of IDR are ambiguous because of the evolution of knowledge and real-world issues.
 - It is unclear about how IDR should be initiated, as to whether the approach should be taken via working on a real-world issue or natural progression from a single to multidisciplinary project.
- ii. Conventional mindset in doing research
 - It is a challenge for some researchers to venture into IDR as they feel that their field will be 'diluted' whilst engaging in IDR-based programmes. Moreover, executing interdisciplinary projects also felt like 'moving into foreign territory', with all the concomitant dislocations, confusion, and frustrations due to unfamiliarity of the language, the practices, or even the way people see the world (Bromme, 2000).
 - Thus, the researchers need to develop an open and positive mindset that they will not lose their identity or expertise but instead would be acquiring integrated knowledge, skills and solution that could not be achieved by means of a single discipline.

- Lach (2014) has described that those who engage in IDR are tolerant for ambiguity and paradox amid complexity, have the willingness to work with others, openness to the perspectives of other disciplines, and humility.
- iii. Lack of researchers' visibility and ways to promote IDR
- The lack of visibility of our researchers is also a concern. Researchers face difficulty in finding experts from different disciplines for IDR collaboration.
 - The publicity on existing IDR that has been conducted to create awareness to the public and researchers who are interested to venture into IDR is also lacking.
- iv. Lack of research ecosystem support
- Researchers feel that the existing awarding systems such as key performance index (KPI) and promotion do not take into consideration industrious effort in the measurement of involvement or performance of researchers undertaking IDR.
 - Researchers voiced the opinion that support from top management is essential for establishing a conducive research ecosystem such as shared facilities to encourage researchers to work with others across faculties.

4. Recommendations and the Way Forward

In accordance with the challenges enumerated earlier, the proposed recommendations and the way forward that may be undertaken towards fostering effective IDR are elaborated. This is presented in terms of visualisation of the improvement of five key conditions.

- i. Organisation administration
- Assisting in building bridges – provide platforms and sessions to facilitate networking and linking researchers with potential collaborators including industrial partners, NGOs, agencies and communities.
 - Facilitate positive attitude amongst researchers – organising research empowerment training, motivation and sharing session on successful IDR researchers and programmes.
 - Recognition and rightful acknowledgement for academic researchers who foster IDR. The paradox of interdisciplinarity is that 'it is encouraged, but poorly rewarded' (Science Europe, 2019). IDR programmes are also designed for good impact towards the betterment of society. Thus, the dedicated effort of the team in developing and sustaining a programme, which includes non-academic measures and output, and constant engagement with stakeholders should be justly recognised and acknowledged in evaluation measures such as key performance index (KPI) and promotion. Recognition awards may also be given for programmes that perform outstandingly in different categories.
- ii. Building bridges
- Foster communication – Seminars, workshops or sharing sessions can be conducted to facilitate and improve communication among researchers, stakeholders and industry. Sharing sessions for inculcating IDR could include enhancement of the IDR concept and knowledge for researchers and inspirational dialogue with successful IDR leaders.

- Linking researchers – As an entity closest to the researchers, faculties can play a vital role in assisting researchers in building linkages across faculties or disciplines. Faculties could also function actively in bridging researchers with industries, non-governmental organisations and stakeholders.
- Mentorship – The faculty could encourage the inclusion of the IDR concept in the existing mentorship system.

iii. Supporting the project

- IDR review committee – Establishing an interdisciplinary review committee comprising experts and successful IDR leaders is essential for recognising potential research with high impact.
- Involvement of related funding organisations and stakeholders can further strengthen the IDR project.
- Adequate time for mutual learning – Allow sufficient time to build consensus among researchers, considering they have diverse backgrounds, research niches and nature of work prior to grant call via informal discussion and pre-proposal workshop.

iv. Organisation of facilities

- Research ecosystem – The faculty is encouraged to provide conducive research ecosystems that include shared instrumentation, common space and research-informative websites and social media platforms to increase the visibility of their researchers.
- Improved interaction and promotion space – The creation of common spaces that can enhance casual meetings among researchers such as cafes, cubes and co-working spaces are essential for informal and relaxed meetings. Such conducive environment is likely to enhance the gathering and exchange of ideas among researchers, leading to the ideation of interdisciplinary programmes.

v. Positive attributes

- Researchers must be open-minded, tolerant and willing to learn while venturing into the challenges of IDR.
- Integration into the IDR team – Researchers are encouraged to be involved from the early stage of the proposal, conduct frequent meetings among team members and acknowledge the contribution of the various team members to the project.
- Communication and IDR skills – Researchers should invest their valuable time to attend research empowerment training, workshops or sharing sessions that are organised by the administrative unit to improve IDR skills and communication among researchers, stakeholder and industry.
- Leadership – programmes should be led by individuals with a clear vision of the direction of IDR and empathy towards the different research background of team members.
- Understanding different background and research cultures – it must be understood that there are variations in different disciplines, contexts and nature of work.

5. Conclusion

An encouraging number of researchers have taken up the opportunity and challenge of being involved in IDR programmes in their endeavour to solve real-world issues and provide impactful solutions. Having common interests to solve complex problems or those driven by scientific curiosity or practical needs could be a good start for a group of researchers from different areas to initiate an IDR team or programme. However, many still worry about venturing into IDR as they are unclear about the concept of IDR and apprehensive about losing their identity and expertise. A number of key conditions could be promoted to foster and garner the interest of researchers towards IDR. Key conditions that can be improved are organisation administration, facilities organisation, support system and assistance in linkages and networking for researchers. Equally important is to catalyse the integration of various disciplines in the team is the willingness to learn each other's 'vocabulary', methodology, thinking style, and perceive each discipline with equal importance and expectation. The success of IDR is partly attributed to good leadership with clear vision and those with effective communication lines among the team members. Above all, in developing a good IDR, researcher who ventures into the challenges of IDR, an individual with positive attributes such as perseverance, open-mindedness and willingness to learn, is crucial.

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