

Fostering Global Learning through Virtual Internationalisation-at-Home: A Cross-Cultural Pharmaceuticals and Biotechnology Collaboration between Ireland and India

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Abstract

This study explores the implementation and outcomes of a science-focused Internationalisation at Home (IaH) initiative involving second-year applied science students from South East Technological University (SETU), Ireland, and Kamla Nehru Mahavidyalaya (KNMN), India. Designed for students without access to mobility programs, the project combined virtual teamwork, cultural exchange, and practical experimentation in protein extraction and product formulation. Communication occurred primarily via WhatsApp and culminated in a joint online presentation. A mixed-methods survey captured students' perceptions, benefits, and challenges. Results revealed high satisfaction, particularly with intercultural interaction, CV enhancement, and teamwork. However, communication difficulties and resource asymmetry were noted. Students expressed strong interest in future collaborations and offered constructive suggestions to improve project feasibility and engagement. This study affirms the potential of IaH in fostering global competencies and intercultural learning within STEM curricula, providing a scalable, inclusive alternative to traditional study-abroad programs while highlighting areas for pedagogical refinement.

Keywords

Biopharmaceuticals teaching, Higher education, Internationalisation at home, Ireland-India partnership.

INTRODUCTION

In an increasingly interconnected world, universities are embracing strategies to provide students with global competencies without requiring physical mobility. Internationalisation at Home (IaH) refers to integrating international and intercultural dimensions into the formal and informal curriculum of domestic students who do not participate in study abroad programs [1]. This approach fosters cross-cultural awareness, global citizenship, and intercultural communication skills, preparing students for diverse professional environments. IaH activities can include collaborative online learning, international guest lectures, multicultural group work, and exposure to global perspectives within local classrooms.

Understanding students' educational experiences in IaH activities is crucial to evaluating their effectiveness and identifying areas for improvement. While previous research highlights the benefits of IaH, such as increased cultural awareness and enhanced employability skills, student perceptions and engagement levels can vary based on the structure and delivery of such initiatives. This type of activities in scientific areas where a laboratory component is added poses more potential for learning but also its own challenges. For that reason, programs such as pharmaceuticals, biotechnology or other laboratory heavy programs do not

often avail of this type of activities.

This study aims to: (a) Assess students' perceptions of their IaH experience (b) identify the benefits they gained for students and academics from scientific areas, particularly Pharmaceuticals and Biotechnology, (c) examine the challenges they faced.

To achieve these objectives, this research employs a survey-based approach to gather qualitative and quantitative data from students who participated in a specific IaH initiative. The survey includes closed-ended and open-ended responses to capture perceptions and personal reflections. The findings will contribute to the growing body of research on IaH and inform future educational practices aimed at fostering inclusive internationalisation strategies in the area of sciences.

Internationalisation at Home (IaH) has gained increasing recognition as a essential approach to fostering global citizenship among students who might not have the opportunity to study abroad [1]. Unlike traditional mobility-based internationalisation, which benefits only a small proportion of students, IaH provides an inclusive framework for intercultural learning within the institutions. Research suggests that well-designed IaH activities can equip students with essential global competencies, such as cross-cultural communication, adaptability, and an appreciation for diverse perspectives [2].

One of the key theoretical foundations of IaH is intercultural learning, which emphasizes the development of cultural awareness, empathy, and the ability to navigate diverse social and professional contexts [3]. Experiential Learning Theory (ELT), learning is most effective when students engage in direct experiences followed by critical reflection [4]. In the context of IaH, activities such as virtual exchange programs, collaborative online learning, and joint projects with students from different cultural backgrounds provide hands-on opportunities to develop these skills [5].

Research indicates that such experiences can foster global citizenship attributes among third-level (higher education) students by enhancing their intercultural sensitivity and their ability to work in international teams [6]. These skills are particularly valuable in preparing students for globalized job markets, where cultural intelligence and adaptability are crucial [7].

Despite the potential benefits, the level of student engagement in IaH activities varies based on institutional support, curriculum integration, and individual student motivation [1]. Studies highlight that students in developed countries may perceive international collaborations with peers from developing countries as primarily charity-driven, rather than as mutually beneficial learning experiences [8]. Overcoming such misconceptions requires well-structured programs that emphasize reciprocal learning and equal partnerships between participants [9].

Effective engagement strategies include structured reflection exercises, guided intercultural dialogues, and problem-based learning approaches that encourage students to actively contribute and recognize the expertise of their peers, regardless of geographic or economic background [5].

One of the most significant contributions of IaH to higher education is its potential to advance Equity, Diversity, and Inclusion (EDI), particularly in collaborations between developed and developing countries. Traditional internationalisation models, which rely on student mobility, tend to favor students from higher socioeconomic backgrounds, reinforcing existing global inequalities [10]. In contrast, IaH removes financial barriers by providing global learning opportunities within local institutions, allowing a more diverse student population to participate [11].

Furthermore, research has shown that carefully designed IaH initiatives can challenge stereotypes and decolonize international education by ensuring that knowledge exchange is bidirectional [6]. For example, virtual collaborations between students in Europe and Africa have been found to break down hierarchical assumptions and foster mutual learning, rather than positioning students from the Global North as "mentors" or "helpers" [12].

Compared to traditional study-abroad programs, which often reinforce exclusivity, IaH offers the following EDI-related benefits:

Increased accessibility for students from diverse economic, cultural, and linguistic backgrounds [1];

More equitable knowledge exchange that values perspectives from both developed and developing contexts [10];

Greater institutional inclusivity, as all students, not just the mobile elite, can engage in international learning [2];

Decolonization of learning experiences, ensuring that voices from the Global South are actively integrated into international education discourse [2].

The literature supports the transformative potential of Internationalisation at Home in fostering intercultural competence, global citizenship, and inclusive international education. However, ensuring meaningful engagement and addressing EDI concerns requires intentional program design that promotes equal partnerships and reciprocal learning between developed and developing countries. Future research should continue to explore best practices for maximizing the impact of IaH in higher education, particularly in ensuring that all students, regardless of background, benefit from international learning opportunities.

METHODS

Research Design

This study employs a survey-based research design to assess students' educational experiences in an Internationalisation at Home (IaH) activity. The survey method was chosen to gather both quantitative and qualitative data, allowing for a comprehensive understanding of participants' perceptions, the perceived benefits, and the challenges they encountered. The study follows a cross-sectional approach, capturing responses at a single point in time after the completion of the activity.

Participants

The study involved 20 students who participated in the IaH activity:

- 10 Indian students from KNMN University (2nd and 3rd-year Biotechnology students).
- 10 Irish students from South East Technological University (SETU) (2nd-year students from the Pharmaceutical and Drug Formulation degree).

The Indian students were recruited through a video invitation distributed by the Biotechnology program director at KNMN University. Interested students contacted the researcher via email and were then randomly assigned to groups. Each group consisted of four students (two from India and two from Ireland), ensuring balanced cross-cultural collaboration.

Description of the IaH Activity

The students engaged in a virtual collaborative project focused on protein extraction and product formulation:

The groups selected waste products available in India for protein extraction.

The Irish students conducted the laboratory work, extracting proteins from the chosen waste materials.

The Indian students provided insights on culturally relevant product formulations that could incorporate the extracted protein.

Communication was maintained primarily through WhatsApp group chats, where students shared ideas, discussed progress, and collaborated on problem-solving. The researcher was present in all WhatsApp groups in an observatory role, ensuring smooth communication but without direct intervention.

Survey Structure and Distribution

To evaluate the student experience, a 12-question survey was developed and distributed to all participants. The survey was created using Microsoft Forms and shared via WhatsApp to ensure accessibility. It included a mix of:

Likert scale questions (measuring perceptions, engagement, and learning outcomes).

Multiple-choice questions (assessing specific aspects of the activity, such as ease of collaboration and communication effectiveness).

Open-ended questions (allowing students to express their experiences, challenges, and suggestions for improvement).

Data Analysis

The survey responses were analysed using Microsoft Excel 2022.

Thematic analysis was applied to open-ended responses to identify key themes related to student experiences, engagement, and perceived benefits of the IaH activity.

RESULTS AND DISCUSSION

All participants completed the survey, with an equal number from each institution—10 from South East Technological University (SETU) and 10 from Kamla Nehru Mahavidyalaya, Nagpur (KNMN). Respondents were a mix of first- and second-year students. On average, they rated the experience 4.6 out of 5, indicating a high level of satisfaction. These results reflect strong student engagement and suggest that the Internationalisation at Home initiative was a positive and enjoyable experience overall. Notably, these findings align with previous studies that also reported predominantly positive feelings and high satisfaction levels among students participating in a similar international collaborative project across five universities [13]. Both studies underscore the value of cross-cultural engagement in enhancing students' educational experiences.

Students from both South East Technological University (SETU) and Kamla Nehru Mahavidyalaya, Nagpur (KNMN) reported a range of shared and distinct benefits from participating in the internationalisation-at-home (IaH) collaboration (Fig. 1). Across both cohorts, *CV enhancement* and *personal growth/building confidence* emerged as top-rated benefits, reflecting a common appreciation for professional development and increased self-efficacy. Similarly, *cultural exchange* and *exposure to different perspectives* were consistently valued, highlighting the

importance both groups placed on intercultural learning. However, key differences also surfaced: SETU students emphasized *problem solving and innovation*, pointing to a strong association between the project and critical thinking, whereas KNMN students highlighted the *development of technical skills or acquisition of new learning*, suggesting a focus on practical academic outcomes. These observations mirror the findings of studies on the benefits of internationalisation identified cultural knowledge, personal growth, networking, multilingualism, and empathy as central gains for students [13]. Notably, her participants also underlined the importance of global exposure and communication skills—findings that strongly resonate with those of the SETU-KNMN cohort. Overall, while both groups valued the intercultural and personal development afforded by the IaH activity, the nature of the benefits perceived was subtly shaped by their institutional and educational contexts, affirming the broader literature on the diverse impact of virtual international collaborations in higher education.

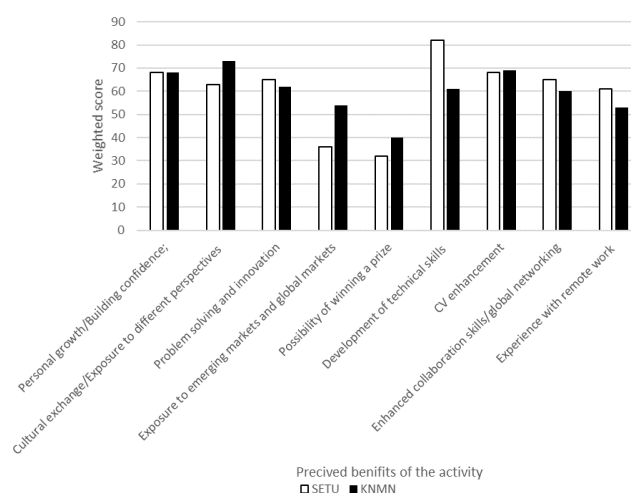


Figure 1. Weighted score of the answers to the question "rank the following benefits of participating in this international project in order of importance to you, with the most important at the top." With white being the answers by SETU learners and black by KNMN learners

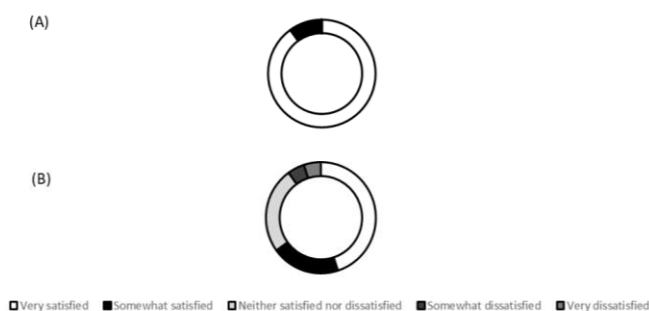


Figure 2. Satisfaction by the learners with the academic support from (A) their own institution and (B) the partners institution.

To evaluate whether students felt adequately supported during the Internationalisation at Home (IaH) project, participants were asked to rate their satisfaction with academic support from both their own institution and the partner university. The two survey items- “How satisfied are you with the support from the lecturer in your institution during this activity?” and “How satisfied are you with the support from the lecturer in the partner institution during this activity?”—were designed to assess the perceived availability and effectiveness of instructional guidance in a cross-institutional setting.

The findings show a clear pattern: all participants expressed either very satisfied or somewhat satisfied levels of support from their own institution, indicating strong local engagement and responsiveness. In contrast, while satisfaction levels were somewhat lower for support received from the partner institution, the majority of students (over 50%) still rated their experience as very or somewhat satisfied. This suggests that although the geographical and institutional separation posed some challenges to consistent support, the collaborative framework was effective in maintaining a functional level of mentorship across borders.

These findings align with previous research that emphasized that student satisfaction in international virtual collaborations is heavily influenced by perceived peer and faculty commitment [14] and the critical role of institutional support structures in facilitating meaningful intercultural learning through IaH initiatives [13]. The current project reinforces these conclusions, underlining the importance of proactive academic involvement on both ends of a partnership to ensure student success.

students were asked to reflect on what aspects of the Internationalisation at Home (IaH) activity they found most enjoyable. Their responses provide valuable insight into the components of the project that were most engaging and impactful from the learner's perspective.

Students highlighted a diverse range of experiences as the most enjoyable aspects of the project, with a dominant theme being interpersonal and intercultural interaction. Comments such as "interaction with different people globally", "working with international students, sharing our culture", and "making contacts with Irish students and professors" reflect the significant value learners placed on cross-cultural engagement. These responses are similar previous similar studies who reported that students in international virtual collaborations highly appreciated the opportunity to connect with peers from different cultural and academic backgrounds [14].

Another recurring theme was the teamwork and collaboration component, as evidenced by phrases like "working with my team member", "team work and exposure to different people", and "engagement of students from two different institutions". This shows that students engaged in Collaborative Online International Learning (COIL) and valued the development of interpersonal communication and cooperation skills as key outcomes of their experience [15].

In addition, learners mentioned project-related milestones—such as "presenting experience", "lab work", "seeing all the hard work come together", and "the final presentation with online voting"—as especially satisfying. These elements not only gave a sense of accomplishment but also made the project feel dynamic and rewarding. The novelty and diversity of the experience were captured in remarks like "something different that we never did before" and "everything", suggesting a general enthusiasm for non-traditional, experiential learning formats.

The emphasis on enjoyment through cultural research, communication, and collaborative achievement reinforces the pedagogical potential of IaH as a meaningful alternative to physical mobility. Such activities not only improve global awareness but also enhance empathy, confidence, and academic engagement—outcomes reflected in the positive sentiments expressed by participants in this study [13].

To better understand obstacles encountered during the Internationalisation at Home (IaH) activity, students were asked to describe the most challenging aspects of the project. Their responses revealed key areas of difficulty, particularly related to intercultural communication, time zone coordination, and technical limitations.

A dominant theme across responses was communication challenges with international partners, particularly those stemming from time zone differences. Phrases such as "a little communication gap", "communicating due to time difference", and "overwhelming to communicate with each other" highlight the logistical strain of coordinating virtually across continents. One student noted that “the colleagues in India weren't always responsive during the day and were flooding us with messages at night,” underscoring asynchronous communication as a barrier to effective collaboration. These findings are consistent with prior research, that found that sustained engagement and reciprocal commitment are essential for student satisfaction in international virtual collaborations [14].

Another major area of difficulty was technical and experimental limitations, with multiple students reporting issues such as "extraction protein", "estimating protein", and "the protein extracted wasn't in a large enough amount to try out many products." These issues reflect both material constraints and limited access to hands-on lab work, particularly for Irish students, as noted in the comment “not doing any of the technical part.” This highlights an often-overlooked challenge in virtual international collaborations: equity in task distribution and resource access. Experiential imbalance—where one group engages more with hands-on activities—can affect perceptions of fairness and overall engagement [13].

Finally, students also reported challenges in idea generation and project design, including "coming up with the idea" and "finding the ideal formulation." These responses suggest that while intercultural collaboration fosters creativity, it can also amplify cognitive load when students are navigating unfamiliar scientific and cultural domains

simultaneously.

Despite these challenges, the majority of students maintained a positive outlook on the project, which suggests that the learning benefits outweighed the logistical barriers. This reinforces the importance of providing structured support, time management tools, and clear communication channels in future IaH projects.

The open-ended feedback provided by students reveals positive sentiments toward the Internationalisation-at-Home (IaH) activity, alongside constructive suggestions for future improvements. Thematic analysis of the responses identified three primary themes: enthusiasm for continued collaboration, desire for enhanced hands-on engagement, and recommendations for logistical adjustments.

When asked for further feedback, the most prevalent theme was a strong interest in future collaborations, reflected in comments such as “Would like to do the same type collaboration again”, “It was a great experience”, and “I have a great time collaborating... looking for another opportunity.” The sentiment that these collaborations are “helpful opportunities” for understanding global markets and solving shared challenges aligns previous studies that emphasise global awareness and empathy as key outcomes of internationalisation efforts [13].

Lastly, students offered constructive suggestions focused on technical feasibility and time management. Several noted difficulties related to protein extraction and suggested alternative materials such as enzymes or high-protein waste products. Others proposed extending the project duration or even organizing in-person exchanges in the future (“I wish we could actually travel to India”, “It should be longer so we could extract more proteins”). These suggestions reflect thoughtful engagement with the project design and align with literature advocating for iterative improvements in IaH to better accommodate practical constraints and maximize learning gains [16].

CONCLUSION

This study contributes novel insights into the implementation and impact of a science-based Internationalisation at Home (IaH) activity between students in Ireland and India. As a rarely documented approach within STEM education, this virtual collaboration represents a meaningful step toward integrating global perspectives into the curriculum for students unable to participate in physical mobility programs. The findings reveal high levels of student satisfaction, particularly regarding intercultural engagement, CV enhancement, and personal growth. However, challenges related to communication, time zones, and unequal access to hands-on tasks underscore the need for more balanced project design and institutional coordination. Students expressed strong interest in future IaH experiences and offered valuable suggestions to enhance technical feasibility and engagement. These insights can inform the development of more inclusive, interactive, and pedagogically effective IaH models in the future, reinforcing their relevance in a globally

interconnected education landscape.

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