

Enhancing Biomedical Science Graduate Students' Research Communication Skills Through Entrepreneurial Activities

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Abstract

In Japan, graduates are expected to play a significant role in the development of 'knowledge professionals', which leads to the increased production of knowledge and value creation. As a result, graduate students are increasingly required to enhance and develop their transferable skills, including those not only related to conducting but also communicating research. Such students are committed to a research-centred lifestyle; students regularly conduct science research presentations in laboratories or academic conferences and have sufficient experience of academic presentation, but are not accustomed to communicating their research findings to non-technical people. Accordingly, the current work presents a method to lead students to enhance their research communication skills by focusing on the value of their research beyond such publications. A traditional medical oral presentation credit module was altered into one with pitch activities. The module was held in English for a group of graduate students in biomedical sciences at a national university in Japan. The participants were exposed to communicating the social significance and impact of their research through a mock entrepreneurial pitch on how their findings could impact society. According to the participants' self-reflection responses, the pitch activities contributed to enhancing their research communication skills.

Keywords: Graduate Education, Research Communication Skills, Pitch

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Introduction

In the shift towards Society 5.0 proposed by the Japan Cabinet Office, graduate schools in Japan are expected to play a significant role in the development of ‘knowledge professionals’, thereby leading to the increased production of knowledge and value creation. To this end, for universities to obtain graduate educational funding, graduate students are increasingly required to develop and enhance transferable skills including those not only related to conducting but also communicating research. Although students are committed to a research-centred lifestyle, they regularly conduct science research presentations in laboratories or academic conferences and have sufficient opportunities to gain academic presentation experience. However, they are not accustomed to communicating their research findings to non-technical people.

The current study investigates whether research communication skills can be increased via a provision of pitch activities rather than academic or scientific presentation in a traditional medical oral presentation and discussion module. Similarly, Train and Miyamoto (2017) examined whether opportunities to develop science communication skills could be incorporated into the content-heavy science curricula in biology. They integrated assignments into core and elective courses by summarising the incorporation of science communication assignments into the curriculum of the biology major, which resulted in improvement in the participants’ confidence and perception of their communication abilities. Mason and Merga (2022) argue an increasing expectation exists that early career researchers be active in communicating their research with confidence to diverse audiences both in and outside academia.

This pilot study presents an attempt to lead students to enhance their research communication skills by focusing on the value of their research beyond such publications. We altered a traditional medical oral presentation credit module into a compulsory module with pitch activities. Accordingly, this approach exposed students to communicating the social significance or impact of their research through a mock entrepreneurial pitch on how they could return research findings to society. The module was conducted in English, the students’ second language.

Why Research Communication?

Research communication is ‘the process of interpreting or translating complex research findings into a language, format, and context that non-experts can understand’ (Carter & Paulus, 2011). Why do researchers need research communication skills? When communicating own research to people, the audience wonders “why is the research important?” or “Is this research related to me?”, finding a connection of interests in the communication. In this aspect, “value proposition” becomes important; however, some ordinary lectures at universities tend to start without clearly explaining the value proposition or societal impact of the lecture content.

Alpert (2016) provides evidence of a ‘Research Communication Continuum’ in which acquisition of communication skills with broader audiences contributes to greater efficacy in cross-disciplinary discourse among researchers. Society is becoming borderless resulting in increase in collaborations. As a result, ability to explain own research to non-technical people or to target listeners in different settings will be the minimum required skills in the following settings:

- Disciplinary level: experts in different research fields need to communicate for solving a research problem in common through interdisciplinary research.

- Educational level: collaboration between different education stages, for example university professors visit high school to teach or provide tailor-made lectures to the public.
- Organisational level: increased research collaboration between academia, industry, or government.

Each level can be expanded to beyond the national level to the global level; thus, research communication skills in English language will be required.

What is Pitch?

A science or academic presentation is generally given to an unspecified number of audience members, usually researchers who are already interested in the content and share the same field of expertise. Such presentation is typically used to explain findings in step-by-step manner. Moreover, a presentation is a form of transmitting information and is typically passive for audience. On the other hand, in a pitch, a speaker aims to communicate a certain purpose, and finishes with a call to action. The Cambridge Dictionary defines a pitch as ‘to try to persuade someone to do something’. As such, a pitch is for an audience who has no prior knowledge about the content, to expect some kind of action in response to the talk, to promote oneself, and sell one’s future plan such as idea/product/seeds/skills/. Therefore, a pitch goes beyond merely ‘getting people to know’.

Different Types of Pitch

According to Ruiz-Madrid and Valeiras-Jurado (2020), two types of pitches exist: research and product pitches in the academic and business field, respectively (see Table 1).

Research pitches in the academic field	Product (idea) pitches in the business field
Emerging way of disseminating ongoing research to the general public.	Skill for entrepreneurs/start-ups, demonstrating product.

Table 1: Research and Product Pitch

Research pitches constitute an emerging method of disseminating ongoing research to the general public, such as the University of Queensland’s ‘Three Minute Thesis’ competition. On the other hand, product (idea) pitches promote a product to the target audience specifically for seeking investment.

A product pitch can be further categorised into two types; an introduction/description of a company/product/service, or sales pitch demonstrating a product to be purchased or invested in by venture capitalists. Beckett (2022) describes demo and investor pitches in an entrepreneurial setting. A demo pitch emphasises traction and is focused on business whereas an investor pitch focuses on concepts, without traction. Traction means validation of one’s demo product or service. A pitch is typically a skill for entrepreneurs and start-ups seeking collaboration usually regarding investment. At business conferences such as the *BIO International Convention* or *BioJapan*, the participating companies or organisations pitch to introduce and publicise their research or product.

Why Pitch?

As university and industry collaboration continues to proliferate, pitching has become an increasingly necessary skill for researchers. Universities are also subject to demands to implement research results into society. According to Gambhir and Tangkiengsirisin (2023), start-up pitches contain aspects typically found in spoken genres representing the characteristics of spoken text, which implies that the wording involves language used in oral communication.

A pitch and research communication are related. In particular, an ‘elevator pitch’ briefly explains who you are, what you do, and what you expect from the person you are speaking to within the length of an elevator ride. Lacka-Badura (2020) states the ‘job search pitch’, referred to as ‘personal branding pitch’, is viewed as a subgenre of an ‘elevator pitch’. Such an approach is regarded as an essential communication technique to be used by students in future job search situations. The pitch is also a contributing skill and increases employability. Mou-Danha et al. (2019) conducted public speaking and capstone courses with the objective of helping students identify different components of an elevator pitch and assemble such pitches highlighting their strengths, an activity that ultimately increased students’ sense of self-competence. Recent trends in communication training extend a long-held emphasis on business communication skill instruction, thereby suggesting that future communication research should focus greater attention on behavioural learning outcomes (Frei et al., 2023).

Pitch Approach in Teaching for Comprehensive View

‘Pitch’ is captured more as an element of business skills. Based on a module experience, Affolderbach (2022) discusses how participants can learn the necessary skills to connect theory with practice. Accordingly, students develop a project that they present in a TV show, *Dragons’ Den*-style via a pitch to experts for evaluation, which is designed to help participants translate conceptual approaches into practice and results in enhanced transferable skills. May et al. (2022) investigates a universal design problem-based learning exercise in which each student team pitched their new product concept in class.

Methods

Participants

Participants in the module were 12 master’s students who regularly conduct research in the Graduate School of Medicine.

Design

With the objective of enhancing research communication skills, the students were expected to be able to give pitches, capture their academic research as part of society, and discuss the translational idea of their research. The key points were as follows:

- Understand pitches in addition to academic presentations.
- Be aware of the value of own research in identifying and solving social problems.
- Capture how research is translated to society with an entrepreneurial mindset.
- Be able to communicate research to society, overall.

Step	Activity
1	Introduction - connecting research to the world
2	Role play 'Interview with leading scientists'
3	Pitch deck and elements
4	3-minute pitch
5	Reflection

Table 2: The module topics

Step 1: Introduction – Connecting Research to the World

A one-minute ice-breaking self-introduction was conducted. The introductory section mainly focused on returning one's research findings to society. Skill to connect their research to society by knowing and communicating the social impact and significance.

Started with a big and general picture. At the start of the course, the participants were asked to provide feedback on a range of basic questions:

1. What is your research theme?
2. Which UN SDGs does your research most closely relate to?
3. How important is societal impact to your research?
4. Should research funding be tied to demonstrable societal impact?

The participants discussed necessary basic skills for communicating the message to the target with a call to action. For example:

- Trusting relationship, create rapport.
- Talk confidently, no negativity, certainty, confidence: Japan has a culture of humility.
- Conscious decisions as time is limited.

Step 2: Role Play 'Interview With Leading Scientists'

	Interview questions
Q1	Whose problem is it?
Q2	What is the problem? What are the pain points?
Q3	Why do you want to solve the problem?
Q4	Why has the problem not been solved? What are the barriers?
Q5	What are other parties currently doing to address the problem?
Q6	What can you do to solve the problem?
Q7	What would be the significance if the problem could be solved?
Q8	From whom and what kind of cooperation do you need to solve the problem?

Table 3: Problem-solving brainstorming framework

The participants performed the following activity in groups of three.

1. One short-sentence answer to each question in Table 3.
2. Connect the answers without connecting phrases to shorten the scenario.
3. (For example, Let me move on to ...) Shorten and simplify the entire answers.
4. Each participant gave a short one-minute summary.

Step 3: Pitch Deck and Elements

The students were introduced to the term 'pitch' in this step. An ordinary academic research presentation was compared with a pitch to facilitate discussion on what a pitch is and why pitch. The students were then instructed to compose their own story regarding how they would return

their research findings to society. As a warm-up exercise, students were shown video clips from *Dragon's Den*, *Shark Tank*, or a range of pitch competitions and instructed to find corresponding answers from the video clip to the list of interview questions presented in Step 2. Together, the participants discussed the differences between a pitch and the standard way of presenting their scientific research.

Differences included a pitch being composed in language that everyone can understand, short time frame for catching the attention of busy people, conveying information in narrative tone with impact, reducing to facts, not being overly detailed, and offering details after the pitch, thereby making people want to listen further in detail.

Pitch Elements

The video clips facilitated the realisation that a pitch is comprised of essential information transmitted as concisely as possible. A standard set of pitch elements are presented in Table 4.

Cover/Opener	Problem/Pain/ Opportunity	Solution/Product/ Product Demo
Customer/ Market size	Value proposition	Underlying Magic / Unique insights
Advantage/ Competitors	Traction	Business model/ Stakeholders
Go-to-Market	Investment/ Milestone	Team

Table 4: Pitch elements

These elements are compiled into a pitch deck. The participants are introduced to the essence of each aspect as elements. However, biomedical basic researchers may find it challenging to tackle the elements such as a business model. Therefore, the students watched further video clips from *Shark Tank*, for example, and tried to identify the essence and essential information corresponding to the element, business model, and so on. The students also summarised these points in a business model diagram based on stakeholder preferences.

Step 4: 3-Minute Pitch

The students created their own pitches based on their research theme. In this step, students were required to do the following:

- Answer each of the elements.
- Pick appropriate elements to build own deck.
- Connect the elements and compose a story to be conveyed in 3 minutes.
- Include at least 'Problem', 'Solution', 'Value proposition', and add a few more elements of their own choice.

Step 5: Reflection

At the end of the module, the students reflected by summarising what they achieved in scenario writing to be conveyed in 1 minute. All students also completed a reflection-based questionnaire.

Results

None of the participants were familiar with a pitch before taking this module. All 12 participants completed the self-reflection based questionnaire. Given the small sample size, we did not conduct statistical analysis and instead focused on descriptive statistics.

Q1.
Did the pitch activity increase your research communication skills?
Did the pitch activity contribute to enhancing your communication skills?

Yes	Somewhat	Neutral	A little	No
8	4	0	0	0

Q2.
Did you find a pitch is a necessary skill?

Yes	Somewhat	Neutral	A little	No
10	2	0	0	0

Q3.
Did the course activities (your pitch) with an experience-based learning approach provide you with more experience than other similar courses you have taken?

Yes	No	I have not taken any other similar courses before.
10	1	1

Q4.
By comparing your pre- and post-course levels, please clarify how your entrepreneurial skills improved.

Very much	Somewhat	Neutral	A little	Not at all
3	5	2	2	0

Q5.
Did the course benefit you in increasing your interest in entrepreneurial learning?

Yes	Somewhat	Neutral	A little	No
6	5	0	1	0

Q6.
Suppose you are assigned to offer a group of integrative biomedical graduate students a research communication course in an international setting.
How will you improve the course? What will you do differently?

Make each session shorter. If we don't know what a student says, we use some Japanese . If we can use Japanese a little, it will be easier to say something in class.
I would prepare a lecture on 'Pitch' for the students. After this lecture, I think the students who are highly specialized in a certain field should acquire the ability to output their own research and what they want to achieve in the future. I also thought it would be good to have debates among students in addition to pitches . I thought it would be a good idea to decide on a precise theme, and to further improve the ability to output ideas by exchanging each other's ideas.
I would like to conduct more group work .
First, organise the necessary information and try to use as few technical terms as possible . The necessary information should be further divided into the following categories: background, reasons for research, research content, and clinical perspectives. Finally, prepare slides and other materials according to the presentation time.
Since the English proficiency of each student varies , I would add slides and time to the lecture to check whether everyone is following in both English and Japanese . I think the content and overall structure of the lectures are very likely to lead to skill improvement, so I think it's okay to leave them as they are.

The written feedback in Q6 provided ideas and improvements that can be grouped into two main aspects: language concerns and activity format. Some participants thought use of Japanese language should be allowed and combined with English, especially when focusing on pitch specific terminologies. Some prefer to have debates among students in addition to pitch, or more group work.

Conclusion

This pilot study sought to establish whether regular biomedical science students are capable of developing research communication skills through the entrepreneurial activities involving pitches. Given the small sample size, the study focused more on the teaching approach. The student responses revealed the following key points:

- All the students became aware of pitches for the first time. The contents were new; they have not done any similar activities in the past.
- They learnt pitches and related terms are used in the arena of academia-industry collaboration or start-up purposes.
- Majority agreed that the module contributed to increasing research communication skills.
- Majority agreed that the module approach contributed to increasing their interest in entrepreneurial mindsets.

Limitations and Prospects for Improvement

Although a lack of business and entrepreneurial skills cannot be avoided, a pitch approach was an effective teaching package to nurture their translational mind and their research communication. However, the following limitations must be acknowledged:

- Sample size was small. A larger sample may lead to more dispersion in the results regarding whether students feel such approach helped enhance their communication skills.
- Conducted in non-native language; language follow up may be required. Research communication fluency may increase if conducted in Japanese.
- Cultural context; English is increasingly preferred as the language for pitching, particularly to international audiences.
- The focus was on improving oral research communication skills; written communication skills is a different issue that should be tackled in future research.

For researchers who may not possess sufficient English language skills, Mason and Merga (2022) note that interactive styles of communication may prove more challenging than more passive styles. Regardless of the native language, repeated practice and experience of speaking in public with mentors may increase confidence and skills.

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