

Jamaica: Assessing Science Communication at the Post-Graduate Level

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Conference Abstract

Jamaica has placed high value on the importance of Science education since pre-independence. The first batch of 11 students graduated from the Science faculty of the University of the West Indies (UWI), Mona in 1952 and by 2000, the institution had produced more than 9000 science students (UWI, 2015). This has positioned the university as the leading research institution in the country.

Although the quality of scientific research institutions in Jamaica ranks 52 of 137 (Global Competitive index 2017/18), the number of scientific publications/million population consistently underperforms below the target set by the country. This can be partially seen in the analysis of post-graduate statistics from UWI Mona which showed that, although the number of post-graduates increased cumulatively from 2010 to 2017 (538 produced by 2017), the number of Science and Technology publications is <100 per year.

An ongoing survey of current and past postgraduate students, has so far indicated that all respondents consider it important that their work be published. For those who indicated that they have not yet published, reasons for not doing so included lack of time, lack of motivation and negative feedback from their supervisor.

The Science and Technology curriculum at UWI is heavily focused on the subject matter while little attention is given to the need for a scientist to communicate their research to the public. This has been observed for courses at both undergraduate and post-graduate levels. The key questions of this research paper are:

- To what extent is the importance of science communication emphasised in post-graduate studies?
- What factors negatively influence a post-graduate's decision to publish?
- What measures can be put in place to ensure that a higher percentage of post-graduate students publish their research findings?

The University of the West Indies was used as a model for answering the above questions using data available from the University, as well as findings of a post-graduate survey and the results of interviews conducted with post-graduate supervisors.

Introduction

Since pre-independence, Jamaica has placed high value on science education, with the first batch of 11 students enrolled in the Science faculty of the University of West Indies (UWI), Mona in 1949. By the year 2000, UWI had produced more than 9000 science students. It is also considered to be the leading research institution in the country. The number of post-graduate Science and Technology (S&T) students who graduate each year from UWI is 67 on average and each graduate would have been involved in some kind of research. There is no doubt that the research undertaken at the university is critical in each respective field. This importance however, does not translate to the outside world, as Jamaica has underperformed on its target for the number of scientific publications per million population. This is indicative of the fact that research data are under-published and shows a deficit in science communication.

Within the National Development Plan (NDP): Vision 2030 for Jamaica, National Outcome #11 focuses on the establishment of 'A Technology-Enabled Society (PIOJ, 2009).' One of the key aspects to establishing this society is the integration of science and technology (S&T) into all areas of development. An indicator used to assess Jamaica's ability to apply Science Technology and Innovation (STI) to development is the '*number of scientific publications per million population.*' The targets set in the NDP for this indicator were ≥ 55 in 2012, ≥ 62 in 2015 and ≥ 105 by 2030. According to the UNESCO Science Report, Jamaica, which led regionally in total number of publications, declined from 136 in 2005 to 117 in 2014; surpassed by Grenada and Trinidad & Tobago in 2014 (UNESCO, 2015).

In light of the aforementioned, this research paper seeks to determine what issues exist that negatively influence a student's decision to publish their research, the implications of these decisions and how to address these issues.

Method

The University of the West Indies (UWI, Mona) was the institution used to address the research problem. Both quantitative and qualitative methods were used to carry out the research.

Interviews were conducted with six lecturers in the Department of Life Sciences within the Faculty of Science and Technology (FST). The questions asked related to the lecturers' roles as graduate supervisors and the extent to which students publish their research.

An online survey was conducted using SurveyMonkey, with both past and current post-graduate students of the Faculty of Science and Technology. The questions asked related to the publication of research findings and communication of these findings to the public.

The Annual Departmental Reports (from 2011/12 to 2016/17) for the UWI were examined to extract data regarding the number of peer-reviewed publications produced in each department. Additionally, the Web of Science (WoS) database (Science Citation Index Expanded) was used to obtain information on the number of publications for Jamaica from 2010 to 2017.

Results

The results of the search on Web of Science showed that between 2010 and 2017, the number of scientific publications per million population for Jamaica has declined and consistently been below

target. Fig. 1 shows these results relative to the cumulative number of S&T post-graduate research students. Although there are an increasing number of researchers added to society, there is no change in the number of scientific publications according to the WoS index.

The results of the research into scientific publications for Jamaica showed that the total output of peer-reviewed publications from UWI exceeded that of the national targets (Fig. 2). This disparity between the Figures 1 and 2, is likely due to the low impact factor for a number of journals in which data from UWI are published. Much of these publications are not represented in the WoS index. The trend in Fig. 2 however, still shows a decline and most of the research were published by academic staff. In the Department of Life Sciences for example, only 13.3% of research papers were published with post-graduate students between 2014/15 and 2016/17.

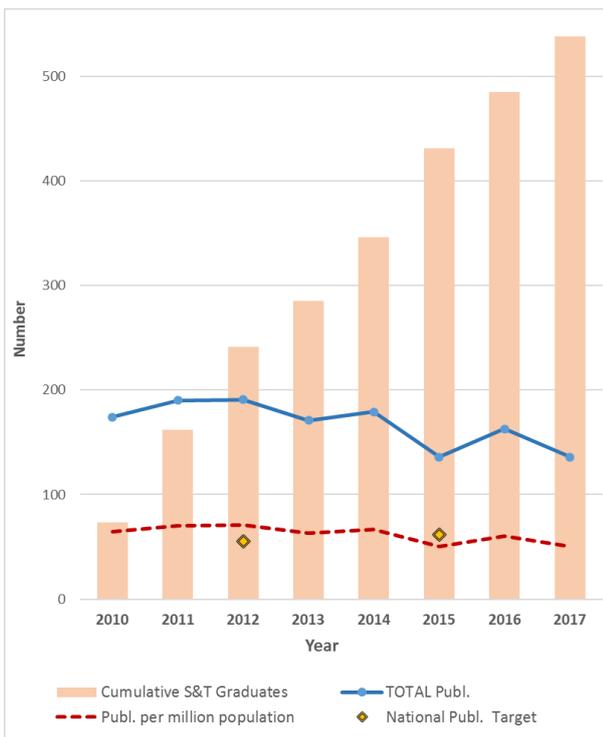


Figure 1 Cumulative number of S&T graduates (higher degrees) and number of peer reviewed publications (total and per million population) from 2010 -2017

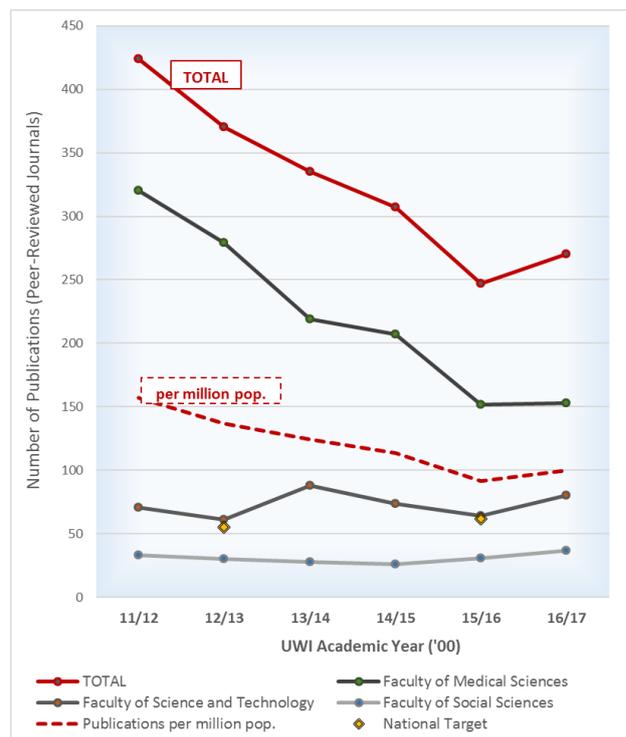


Figure 2 Output of scientific publications from UWI in peer-reviewed journals by Faculty (2011/12 to 2016/17)

From Interviews with Lecturers/Supervisors

The interviews conducted with the lecturers/graduate supervisors revealed interesting results (Fig. 2). For 50% of lecturers, the number of papers published by students was less than the number of students that have graduated. Lecturer 2 (L2) who has been supervising for 25 years, had the highest number of graduates and student publications, while three lecturers had less than 5 student publications in at least 15 years of supervising students. L1 noted that only PhD students published while MPhil students, which formed the majority of students, did not.

The interviews also revealed that the lecturers played a key role in publishing research done by their students. Three lecturers (L1, L5 and L6) drafted half of their students' publications, L2 drafted a third and L3 drafted the majority.

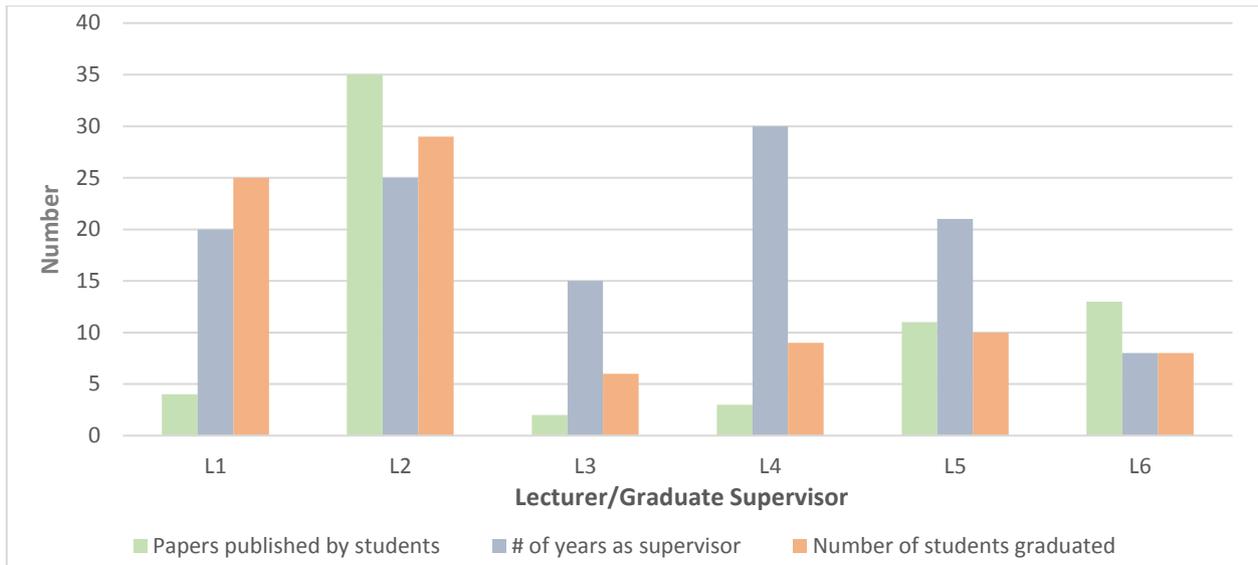


Figure 3 The number of papers published, students graduated and years spent as a graduate supervisor for six lecturers (L) in the Department of Life Sciences at UWI

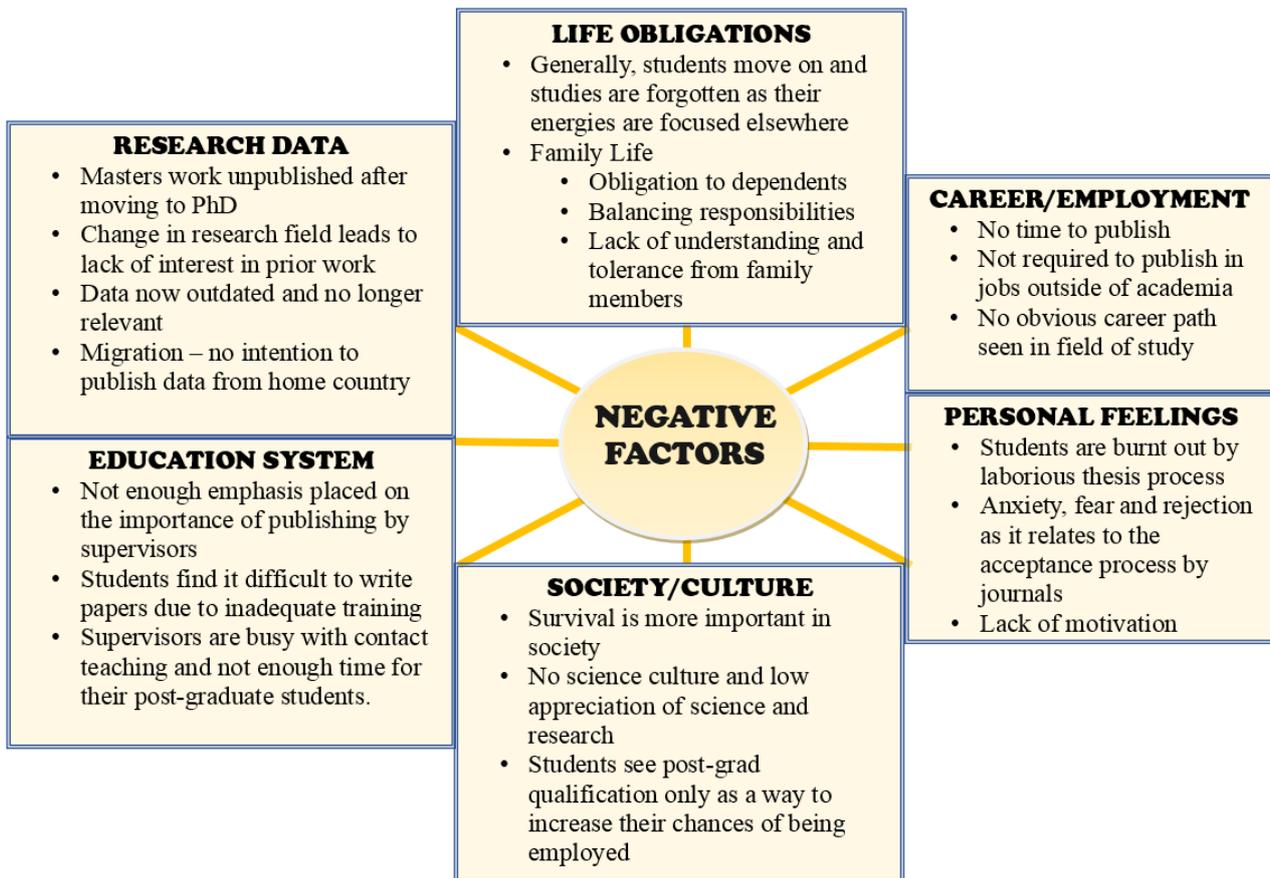


Figure 4 Negative factors that prevent students from publishing, as identified by lecturers interviewed.

There was 100% agreement among all six lecturers that: the cost to publish is not a prohibitive factor, students' preoccupation with working outside of academia affects the decision to publish and they individually emphasise the importance of publishing to each of their students. The answers to the question of 'what would prevent students from publishing,' are displayed in Fig. 4 according to six categories.

When the lecturers were asked to recommend strategies that can be used to increase the extent to which student's publish, the responses could be categorised into three areas – national support, education system and publishing opportunities (Fig. 5). (The formation of a Research and Publication Committee in the Department of Life Sciences is one action that has recently been implemented to address the existing issue of unpublished data for students in that department.)

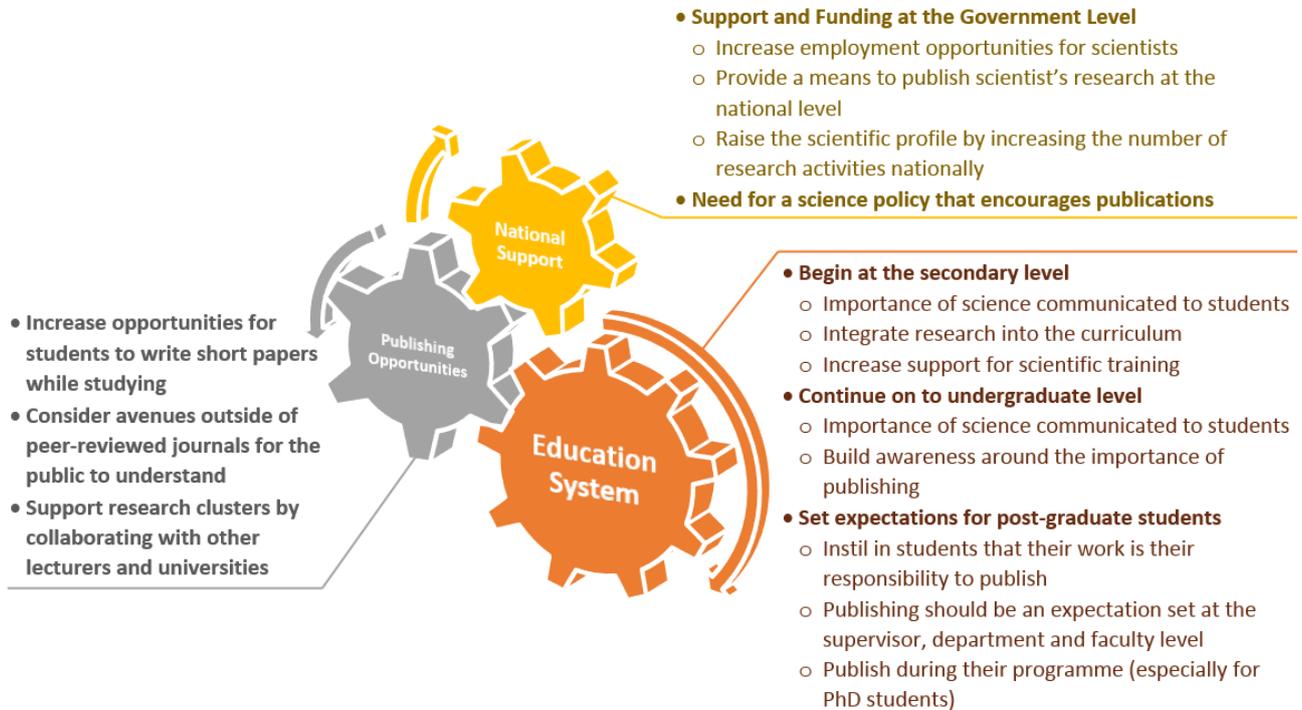


Figure 5 Recommendations given by lecturers interviewed regarding how lack of publishing among graduate students can be addressed

Post-Graduate Survey

The online survey targeted at least 200 post-graduate students, some of which were current and past students of the lecturers interviewed. The response rate was low however, with only 52 students having completed the survey; the completion rate determined by SurveyMonkey was 23%. This lowers the level of confidence in the results but inferences can be made from the data generated.

Females accounted for 56% of the respondents. Most respondents (61.5%) held a Master of Philosophy (MPhil) degree, 26.9% held Doctor of Philosophy (PhD) degrees, 11.5% had a Master of Science degree and 9.62% had an additional post-graduate qualification pending. Some respondents had qualifications for two levels (Masters and PhD).

When asked 'to what extent the respondent considers it important for their work to be published', 80.8% stated important/very important, 15.4% considered it moderately important and 3.9% considered it to be of little importance; none considered it to not be important. Additionally, 90% of respondents indicated an intent to publish in future.

The survey indicated that those who publish are mainly respondents who are qualified at the PhD level (Fig. 6) and this coincides with what was shown from interviews with graduate supervisors. Additionally, where those holding MPhil degrees have published, the majority had just one

publication (Fig 7). The results also indicated that most respondents at PhD and MPhil levels had an intent to publish (Fig. 8).

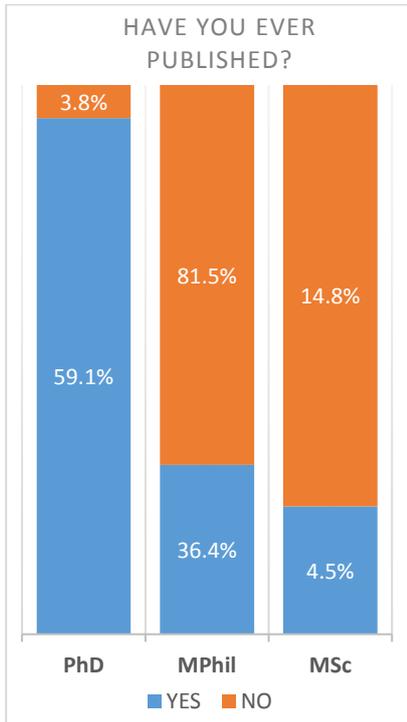


Figure 6



Figure 7

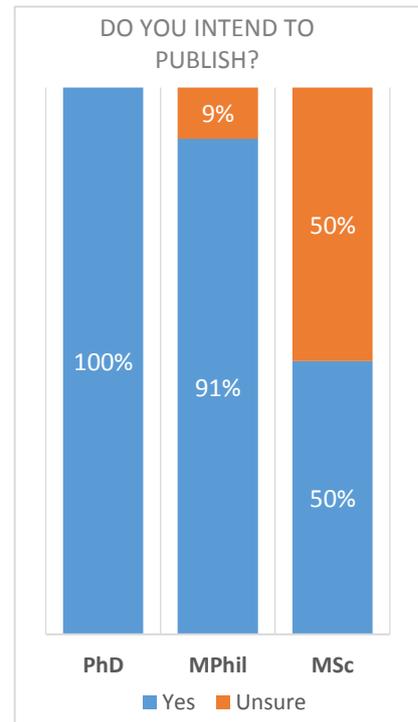


Figure 8

The results indicated that, whether or not the respondents have published, it was generally agreed that the publication of their research was important/very important. The extent to which publishing is considered very important increased as the number of publications increased:

- **100%** of persons with >5 publications considered it very important,
- **68.8%** of persons with 2 to 5 publications, and
- **50%** for those with only 1 publication

From the results shown in Fig. 9, where there was no supervisor influence on the decision to publish, 77.7% of these individuals considering it to be moderately important or of little importance.

Where supervisor influence was strong, the majority of these respondents (97%) considered publishing their research to be very important or important, with the remaining 3% considering it moderately important.

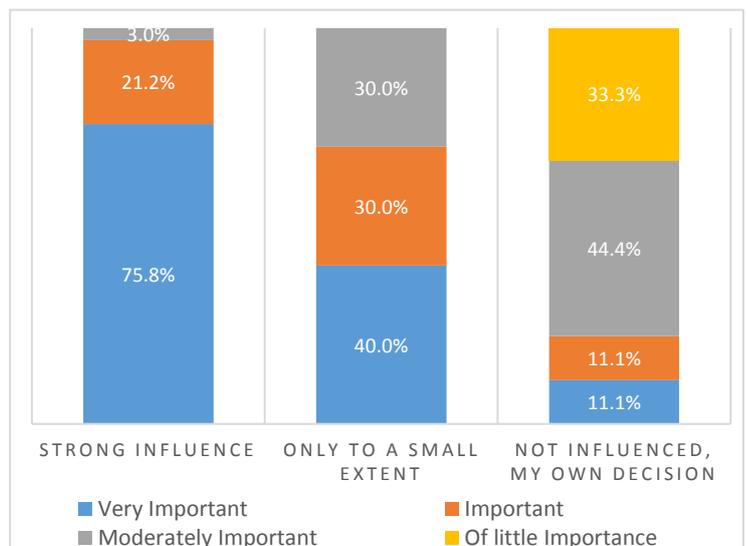
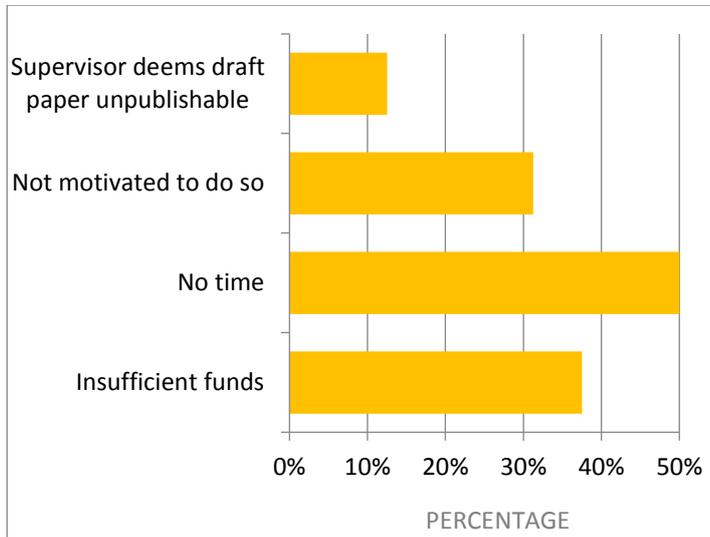


Figure 9 Supervisor influence relative to importance of publishing

For those who indicated that they have not published, the survey probed the reasons for them not doing so. The results in Fig. 10 show that 50% indicated insufficient time as the main factor. (For those who noted lack of motivation as a factor, 80% of these respondents were not influenced at all or only to a small extent by their graduate supervisor.)



From the optional responses to this question:

8 respondents have not published due to their research being in progress, 4 are in the process of drafting papers and 2 noted that they were unaware of how to do so.

One respondent noted that the importance of publishing was not emphasised in the 1990s and after moving on to employment, the MPhil data remain unpublished.

Figure 10 Reasons for not publishing (multiple responses accepted)

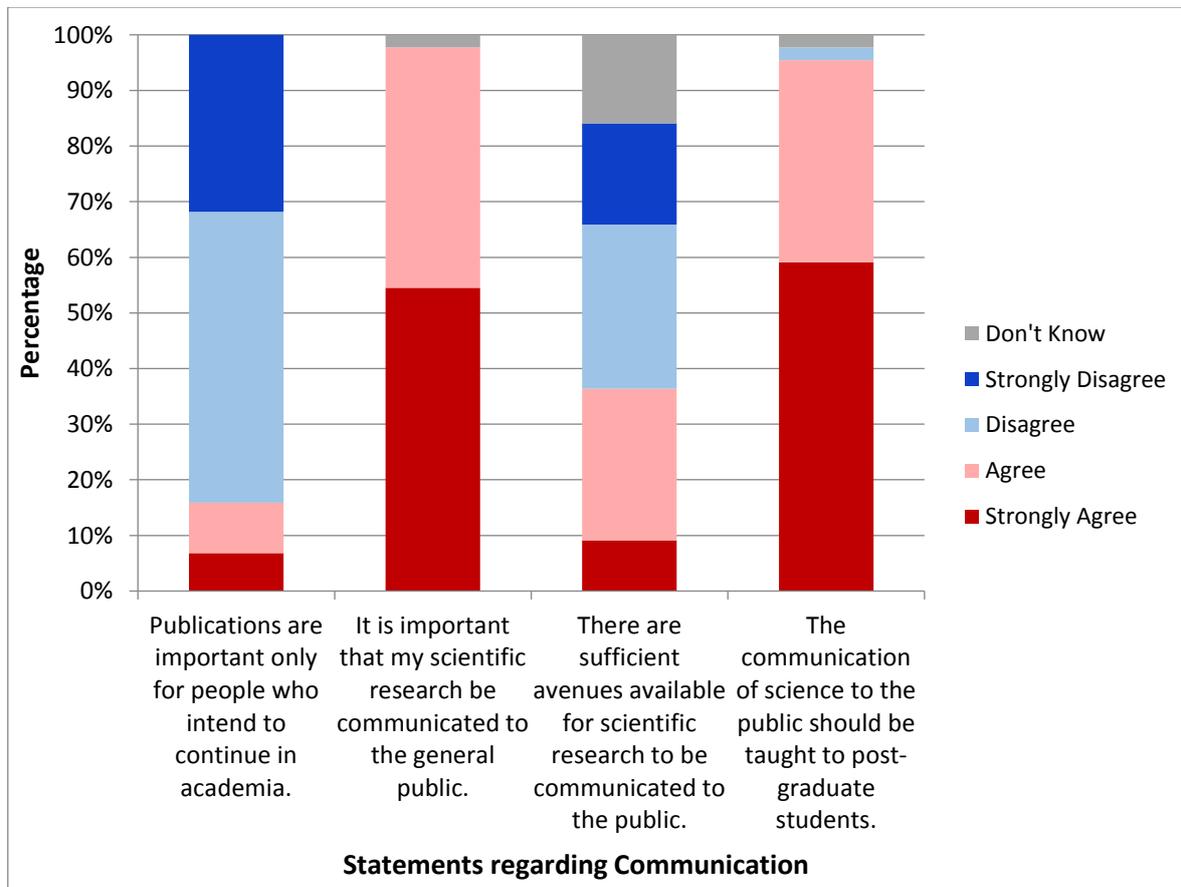


Figure 11 Post-Graduates' opinions regarding publishing and communicating science to the public

The final section of the survey probed the respondents' opinions on four statements (Fig. 11). In general, post-graduates disagreed that publications are important only for those who continue in academia (84.1%). 97.7% of those surveyed agreed that their scientific research should be communicated to the public. Results were mixed however, on whether or not there are sufficient avenues available for scientific research to be communicated to the public. There was high agreement that the communication of science should be taught to post-graduate students (95.5%).

Discussion

As a country which acknowledges the importance of science and science education, it is critical that valuable research be communicated outwards to other scientists, as well as the wider public. With the University of the West Indies being the leading research institution in the country, most scientific publications are produced by those within that institution. At the advanced post-graduate level, each MPhil, as well as PhD degree, is representative of a research being conceptualised, conducted and completed. Whatever knowledge has been obtained from research at this level will undoubtedly be meaningful and thus, worthy of publication.

According to the results, the number of publications per million population was lower than the national target according to the Web of Science index. However, examination of publications out of UWI alone (Fig. 2) showed values above the national target. From Fig. 12, most publications were produced by the Faculty of Medical Sciences, where the West Indian Medical Journal (WIMJ) was the primary publication used. WIMJ itself has a low impact factor (0.224 in 2016 on WoS) and the fact that research is published in journals with low impact factors is the reason there is a difference between figures reported from WoS and UWI. The declining trend in publications however is still cause for concern and more so, because it appears that graduate students play a minor role in these numbers being reported.

The interviews which were conducted with lecturers/graduate supervisors, revealed how the publishing issue among students is viewed from the supervisor's perspective. Essentially, students move on in life and their priorities change upon completion of their post-graduate degree. Working outside of academia was seen as a factor and when the motivation for obtaining a higher degree is primarily for job security, the student lacks a desire to publish. From Fig. 3, scenarios for L2 and L6 were ideal, where for as many years that students were being supervised, about equal numbers of students were graduating and more papers published than the number of years or graduates. From the recommendations given in Fig. 5, a change in the education system that transcends all levels (secondary to post-graduate), increased national support and more opportunities for publishing are key to addressing the existing issue.

The observation by L1 that publications were only done by PhD students agreed with the results obtained from the online survey; those who published were mainly those qualified at the PhD level. From the results presented, the general agreement by respondents was that it is important for research to be published and there appeared to be a link between the supervisor's influence and level of importance.

With 'no time' being the main reason given by students for not publishing (Fig. 10), this also agrees with what was observed by the graduate supervisors. In a society where emphasis is placed on being employed in a good job and maintaining that employment, it is not difficult to understand how working outside of academia would cause a graduate to become less enthused about publishing from their study. However, individuals find the time to do what is deemed important and it is therefore likely, that with a change in publishing culture, graduates will consider publishing a

priority and invest both time and effort in doing so. It was interesting that almost 40% of the respondents noted insufficient funds as a prohibitive factor because this directly contradicted the interview results where all lecturers noted that cost to publish would not be an issue. This suggests that in at least 40% of cases, information regarding the publishing process is not fully communicated to students.

Opinions were assessed and the results are reported in Fig. 11 with regards to publishing research and communicating science to the public. These findings are considered important. While respondents agreed that their research is important and should be communicated to the general public even if they do not continue in academia, more than 60% disagreed or were unaware of avenues to do so. Additionally, almost all respondents agreed to the statement that science communication should be taught to post-graduate students.

These findings indicate a clear intent for the respondents to formally share their research with others but the current system does not effectively allow them to do so. The current system involves players at the national level and within educational institutions; these were noted in recommendations made by the lecturers. There are no science communication courses at the post-graduate level in the Faculty of Science and Technology and at the undergraduate level, the content is minimally covered in one mandatory foundation course. What the results show, is that supervisor influence is one of the key factors which determines whether a student publishes but more institutional support is needed from the university. At the national level, the new Science Technology and Innovation (STI) Policy to be promulgated this year will focus on creating an enabling STI environment that should allow for increased publishing opportunities. With both institutional and educational support, achieving our targets is possible but more so, our science will be communicated to others and can be beneficial to those who receive it.

Conclusion

It is critical that as a nation, the importance of publishing the results of scientific research be emphasised in order for Jamaica to improve our global scientific footprint and for important data to not remain enclosed behind the doors of the university's library. From the results of the study, the importance of publishing is not emphasised to the student by the institution but is instead, emphasis is a task left to the graduate supervisor. More needs to be done by the university to foster a culture of publishing among post-graduate students and national support is needed to create more opportunities for scientists to reach the public.

With institutional and national support, the graduates, which agreed that publishing their data is important, can access the resources to do so. Consequently, there will be an increase in the level of science communication, as well as an improvement in our target of the number of publications per million population.

References

- PIOJ. (2009). *Vision 2030 Jamaica: National Development Plan*. Kingston: Planning Institute of Jamaica.
- UNESCO. (2015). *UNESCO Science Report: towards 2030*. Paris, France: United Nations Educational, Scientific and Cultural Organization.
- UWI. (2015). Overview of the Faculty. Retrieved from <https://www.mona.uwi.edu/fst/about-fsat>

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