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Managing an Attractive Master Study Program: Experiences and Lessons Learned

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ABSTRACT

The paper presents the master study program Social Sciences and Computing, run at the University of Belgrade, Serbia, from the managerial perspective. The aim is to share experiences with program and course delivery over the years. The experiences have been collected through students' evaluation of different courses and the program as a whole, as well as through descriptions of different situations in which the program organizers have found themselves so far. The major challenges identified in running and managing this study program pertain to the program sustainability (given the highly interdisciplinary nature of the program itself), the financial issues, the dynamics of modifying the course contents and the employment perspective of graduates. A useful set of lessons learned over the lifetime of the study program so far is discussed and it largely overcomes the specific program, being more general and useful in other similar situations.

Keywords: Education management, Study program, Interdisciplinarity, EU programs, Case study

Introduction

The master study program *Social Sciences and Computing, SSC* (University of Belgrade, Multidisciplinary Graduate Studies, 2019), run at the University of Belgrade, Serbia, has been developed as part of the project *INCOMING: Interdisciplinary Curricula in Computing to Meet Labor Market Needs*, funded by the Tempus program of the European Commission, project ref. no. 530155-2012 (Tempus Foundation Office, 2016; Tempus INCOMING, 2016). The project objectives were to strengthen international orientation of higher education in Serbia, to increase employability of graduates, and to promote students' and teachers' mobility.

The SSC program targets bachelor-level graduates of different disciplines of social sciences and humanities who want to extend their knowledge in computing and Internet technologies, services and tools. In other words, BA holders in law, economics, languages, philosophy, psychology, sociology, demography, etc. are offered courses in current computing technologies (databases, data analysis and visualization, human-computer interaction, and the like) and quantitative disciplines (statistics, prediction and decision methods, sampling theory, and so on), as well as a range of electives focusing on applications of ICT to specific problems in different fields of social sciences and humanities. All students of the SSC program have to take 2 required courses (*Computer technologies* and *Quantitative modeling in social sciences*) and can choose another 3 elective courses from the total of 29 electives. There is also a mandatory term paper, a mandatory internship and a master thesis for all students who want to earn their master degree in SSC.

The first generation of students has enrolled in the program in the 2014/15 academic year. The program runs successfully ever since, with some ups and downs that can now be seen and analyzed in perspective. Experience with the SSC program organization and management, as well as with delivery of different courses has accumulated over the years. This experience has made possible to identify major challenges in running and managing this study program. Likewise, although the program has proven to be very attractive to students, many pitfalls have been encountered along the way and useful lessons have been learned.

The program has been accredited for 35 master students in each academic year. It is a 1-year, 60-credit (ECTS) study program.

Research Questions

Two specific research questions have guided the continuous analysis of the SSC study program in recent years:

- RQ1: What does it take for a study program like this to survive on the long run?
- RQ2: Is "collective ownership" over this study program the way to go?

The context of RQ1 is partially obvious. As part of dynamics of higher education all over the world, new study programs are offered more and more often, and some of the existing programs become obsolete over time. Competition on the higher education market is harsh, and can kill programs that fail to satisfy students' and employers' changing expectations. In addition, highly dynamic fields of study (and computing is one of them) require a great deal of modifications and adaptations in course offering year after year (U.S. Department of Education, Office of Educational Technology, 2017).

The other part of the RQ1 context is not that obvious. This other part relates to the rules and regulations of the Tempus project that has been the umbrella under which the SSC program has been developed, as well as to the peculiarities of the study program and course offering at the University of Belgrade. The former has required the SSC program to be offered tuition-free before the official end of the INCOMING project (the year 2015). Quite expectedly, the number of applicants in the first year of running the program was much higher than in the subsequent years,

and the challenge has been to maintain the students' interest in the program even after the project ending. The latter is related to the highly decentralized structure of the University of Belgrade. The 30+ faculties (schools) composing the University of Belgrade are pretty autonomous in terms of facilities, human resources, finances and labor division, and typically offer study programs and enroll students autonomously and independently. Still, there *are* study programs (at the MSc and PhD levels) that are accredited and offered by the university (i.e., not by one of its specific member faculties) and that involve teachers from different member faculties of the university. SSC is one of such programs. To this end, organizing and coordinating an interdisciplinary study program with teachers who are administratively with different member faculties requires administrative and managerial skills and efforts that are not typical at other universities.

The context of RQ2 is also related to this decentralized nature of the University of Belgrade. The teachers' mindset at the university is often determined by teaching courses at their faculties, rather than at the university. The number of study programs accredited at and offered by individual faculties is much higher than the number of programs accredited at and offered by the university, hence a teacher's classes at their faculty are often the only classes they teach. As a consequence, the sense of "teaching at a faculty" dominates their activities, whereas "teaching at the university" usually comprises just a minor chunk (if any) of their teaching workload. To this end, it turns out that the sense of "belonging to" and "owning" a study program is largely different when teachers teach courses at a faculty study program from that when they teach at a university study program. The term "collective ownership" in RQ2 is used to denote the (extent of) coherence and community created around the SSC study program, given the circumstances. Essentially, RQ2 examines the teachers' sense of belonging to the SSC program.

Methodology

The teachers responsible for the study programs accredited at the University of Belgrade (study program coordinators) and the university administration collect some data and track activities in such study programs throughout each academic year. These data have been used in this research in an attempt to answer RQ1 and RQ2. In addition, other data have been collected on purpose in this research, and analyses more comprehensive than purely statistical ones have been conducted.

Data Collection

Some data have been collected from students' records. These records contain the usual demographic data, the exam data (grades, credits, dates, etc.), as well as additional information related to the previous degrees of each student. This additional information includes the university/faculty where the previous (bachelor) degree has been earned, the field/discipline of the bachelor studies/degree, the GPA from the previous degree program, information about the student's research publications (if any), and information about the student's exceptional achievements (e.g., if they were the best students in their generation during the bachelor studies).

Students' evaluations of the teachers who teach at the SSC program, of specific courses, and of the study program as a whole are conducted at the end of each academic year. The program

coordinator maintains a database of these evaluations, and also keeps track of popular and less popular elective courses. Note that the students are offered a large number of electives (29), so the statistics about elective courses is of specific interest.

In addition, the program coordinator maintains a "journal" of interesting cases that have taken place during the program runs over the years. These are related to different situations in class, informal conversations with students and teachers, administrative issues and managerial decisions that had to be made at some points when circumstances have not been quite clear. Although these cases are difficult to quantify and make any statistical analysis with them, they provide a valuable source of information for future program management.

Variables / Measurements / Sampling

There are several major groups of quantitative variables that the SSC program tracks:

- *Student populations in the program in each academic year.* The variables in this group include the number of applicants, the number of enrollees, the number of enrollees who receive a government scholarship, and the distribution of students per field of social sciences and humanities where they have earned their previous academic degree (i.e., how many of them have a bachelor degree in law, how many in languages, etc.).
- *Quality of applicants in each academic year.* Although it is difficult to measure the quality of applicants, some variables can be good indicators of this quality, such as the applicants' GPA during their bachelor studies, the number of enrollees with special achievements, and the number of applicants with non-zero research publication records.
- *Teachers involved with the program in each academic year.* Courses in the SSC study program are not one-man shows, and each individual teacher's participation/effort (in terms of the number of classes, the number of lab hours spent with the students and involvement with the students' term papers, internships and theses) varies from one academic year to another. Likewise, the program features occasional participation of guest teachers from other universities and other countries, as well as occasional classes given by experts from different institutions. Thus the variables that the program tracks in this group are indicative of the teachers' interests to be part of the SSC program and include the total number of teachers involved, the numbers of teachers per specific courses, the number of guest teachers from other universities and the number of guest lecturers from other institutions.
- *Students' evaluations.* Students fill online evaluation questionnaires where they can rate the courses, the teachers, the facilities, and the program as a whole. The questionnaires use tailored 5-level Likert scales and students fill them anonymously, in one-time runs only.
- *Program promotion parameters in each academic year.* These variables indirectly reflect the SSC program promotion strategies. They have varied over the years. The variables include the number of radio/TV broadcasting promotions, the number of tweets, the number of Facebook and Instagram posts, the number of blog posts, the number of followers of these, as well as the number of visitors to the Websites where the program is

promoted (such as the relevant university Webpages, the program Website, job-market Websites for students, and so on).

- *Information from other study programs.* Similar variables can be tracked in other study programs accredited at the university level (although not all other programs track all these variables). These provide additional, indirect insights into the organization and management of the SSC program, since the program also continuously learns from experiences of others.

Most of these variables are sampled once a year. For example, the values of the variables describing the student population remain pretty static after the enrollment is completed, so their values are recorded only at the beginning of the academic year. Likewise, all variables related to students' evaluations are sampled only at the end of each academic year, i.e. after the students have gone through all the courses and before they take the exams. Sampling rate is higher only for the variables related to program promotion, since the program promotion campaign is more intensive before the call for applicants is published, and is not intensive during the academic year.

Qualitative data for this research come from students' answers to open-ended questions that exist in online evaluation questionnaires, as well as from discussions with students, teachers, university management and administrative personnel. In addition, the above mentioned "journal" of interesting cases and students' learning portfolios also provide useful qualitative data and information.

Analysis

Two kinds of datasets are used in analyses conducted in each academic year: the datasets pertaining to specific academic year – yearly datasets – and cumulative datasets, generated by combining data from yearly datasets. The kinds of analyses conducted with these different datasets are similar, yet it's possible to put yearly analysis results in perspective, i.e. in the context of the overall analysis.

The data in datasets are accurate. There are no missing values, no erroneous data, and no significant outliers. This is possible because of the small numbers of observations in datasets in each academic year. All the student records are created by the university administration and can be verified by the students and the teachers at any time, hence occasional mistakes are eliminated quickly. The same goes for data about teachers, courses and other study programs. Teachers are responsible for digital evidence of students' achievements (artifacts of their creative work, submissions they make, discussion forums and so on) and for the gradebooks.

Given these facts and relatively small datasets, much of the analysis conducted over time is descriptive and exploratory in its nature. Commonly used descriptive statistics (mean, median, percentages and frequency distributions) are used for describing quantitative variables in yearly and overall datasets. Exploratory analysis is used in order to discover possible relationships among data elements (typically some correlations among variables), patterns and anomalies (if any), as well as to make simple graphical summaries of different variables. Figure 1 shows examples of such graphical summaries for a yearly and overall datasets.

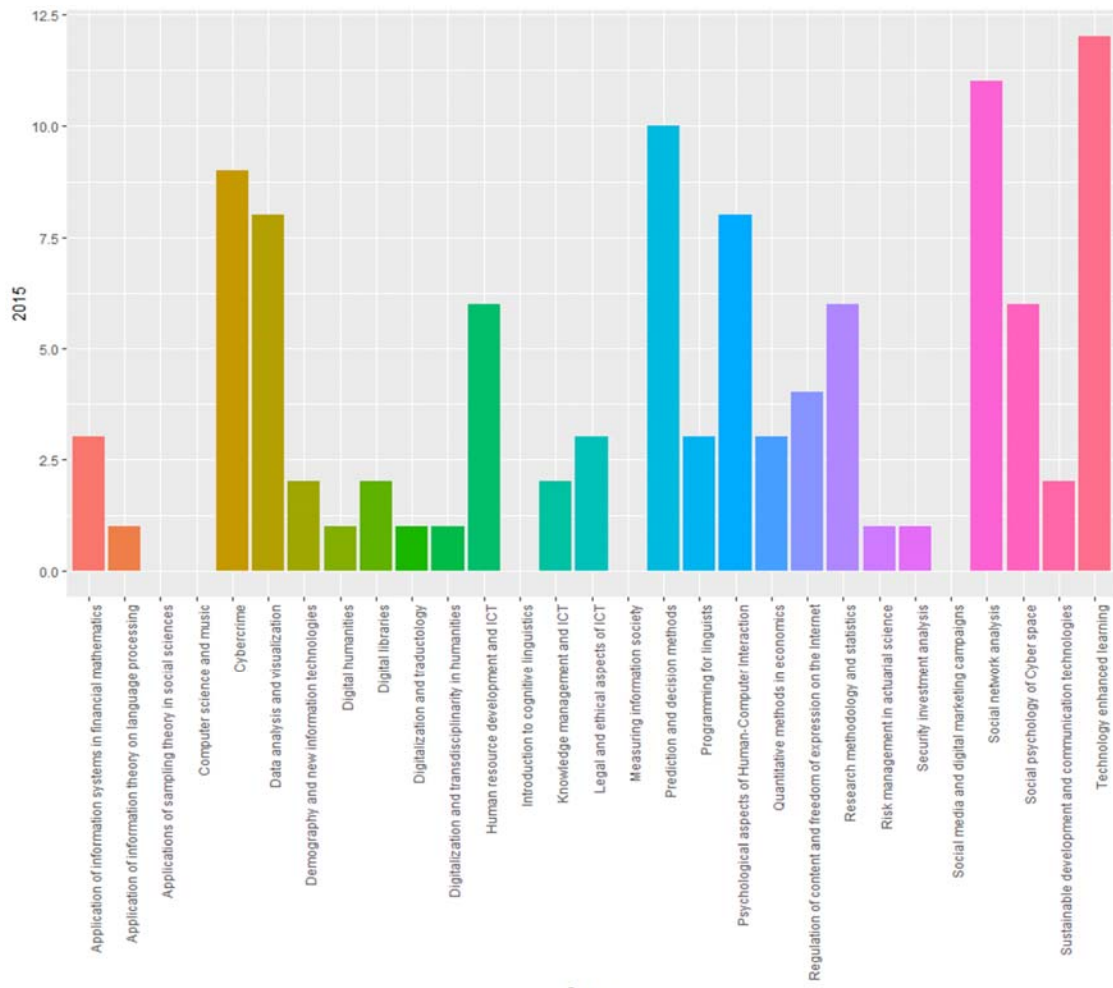
In addition, a group of teachers led by the program coordinator occasionally conducts qualitative analysis of students' and teachers' work and activities. These qualitative analyses typically start from informal discussions with students and teachers after class. Although it is not completely accurate to call these discussions interviews or focus group discussions, they do have many elements of in-depth interviews and focus groups: the teachers in charge guide these discussions by making the students discuss openly the questions that the teachers put. These questions are typically related to the students' impressions about the courses, the topics covered, the availability of relevant resources and facilities, the employability options and the like. The goal is to explore different students' opinions on the questions, to get their perceptions, attitudes, and experiences, and especially to elicit their suggestions about how to make modifications in the study program in order to better meet the students' needs and expectations. No video or audio recordings of these discussions are ever made, but "transcripts" with interesting ideas and important suggestions are always recorded for the purpose of further analysis and managerial decisions.

Constraints

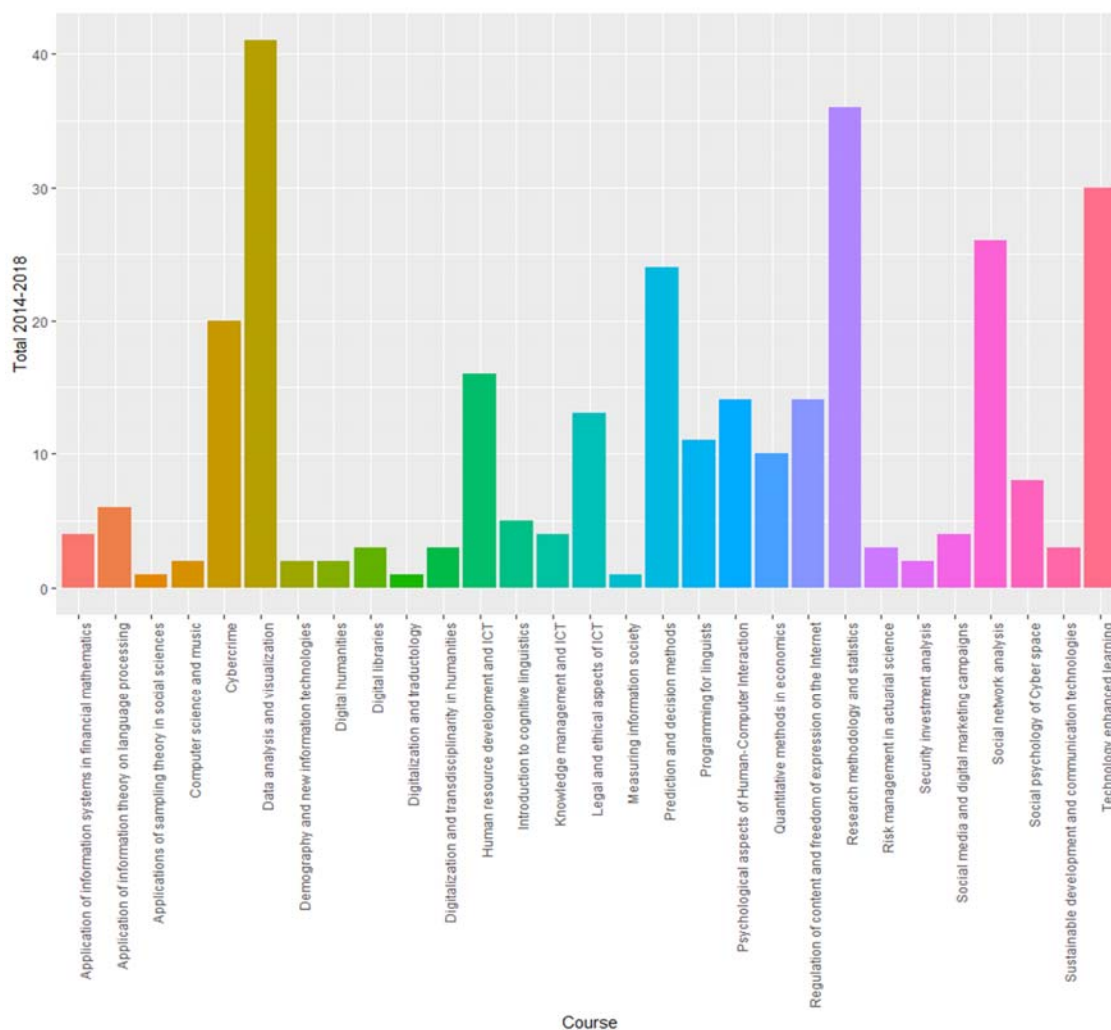
The accuracy of the analyses is slightly hampered by several factors that are difficult to avoid since they are simply part of the master program running culture at the respective university.

First, class attendance is sometimes jeopardized by the fact that many master students are actually full-time employees and can come to classes only after hours. This fact causes not only fatigue in class, but also changes their overall impression of the topics discussed in class and their efficiency in study duties (which reflects to an extent in their student records).

Second, the experience so far shows that year after year the students enroll in the SSC program with large variations in backgrounds in computing and statistics. This is often stressed by the students themselves in group discussions with teachers. Along the same lines, largely heterogeneous groups are typically difficult to teach, which can reduce motivation and interest of both teachers and students.



Course
(a)



(b)

Figure 1: Popularity of elective courses in 2015 (a) and Overall popularity of elective courses (b)

Third, the enrollment policy allows the best applicants to receive the scholarship from the government for tuition-free studying, but the scholarship payment is typically deferred for several months after the start of the academic year. This often creates difficulties in financial management of the SSC program, and indirectly affects some of the data that the program tracks.

Also, the enrollment policy allows students who have failed to complete the program in one year to enroll again in the next academic year. This inherently makes some degree of inaccuracy in the student population data, since these students are administratively treated in the same way as the new enrollees.

An interest of foreign students to join this study program is continuous over the years, but administrative difficulties usually make them give up unless they are on European student mobility programs. Thus the numbers of applicants in the datasets used in the analysis is usually smaller

than what it should be if the administrative obstacles were removed (steps have been taken to finally remove them in the next academic year).

Last but not least, since no recording is made during the informal and loosely structured focus group discussions and meetings with teachers, there is always some slight inaccuracy and a bias in the transcriptions, due to subjective interpretation.

In spite of all these obvious limitations and constraints, the analyses conducted over the years have provided useful results and insights that have made possible to make some important decisions.

Results

Both yearly and cumulative datasets change dynamically, hence there is some variance in the results of the analyses conducted year after year based on students' evaluations and on discussions between students and teachers. Likewise, situations in which the program organizers have found themselves so far are all different. The examples of all these analyses and cases shown here are not the best ones so far; they are rather *typical* and *realistic* for the SSC program, indicating both upsides and downsides of the program. These help the program organizers in making efforts to continuously improve the SSC program.

Evaluations

Examples of students' yearly evaluations of the elective course *Technology enhanced learning* given in the 2015/16 academic year are shown in Figure 2. Similar evaluations were typical in the other courses in early editions of the SSC program. Obviously, students were happy with the fact that modern ICT tools and technology have been used in class, but some thought they have not been able to follow the classes because of the lack of background knowledge in ICT. Because of that, the program organizers have modified several courses in terms of putting more efforts on the basics of the tools and technology used in the courses, as well as on formative assessment and open hours.

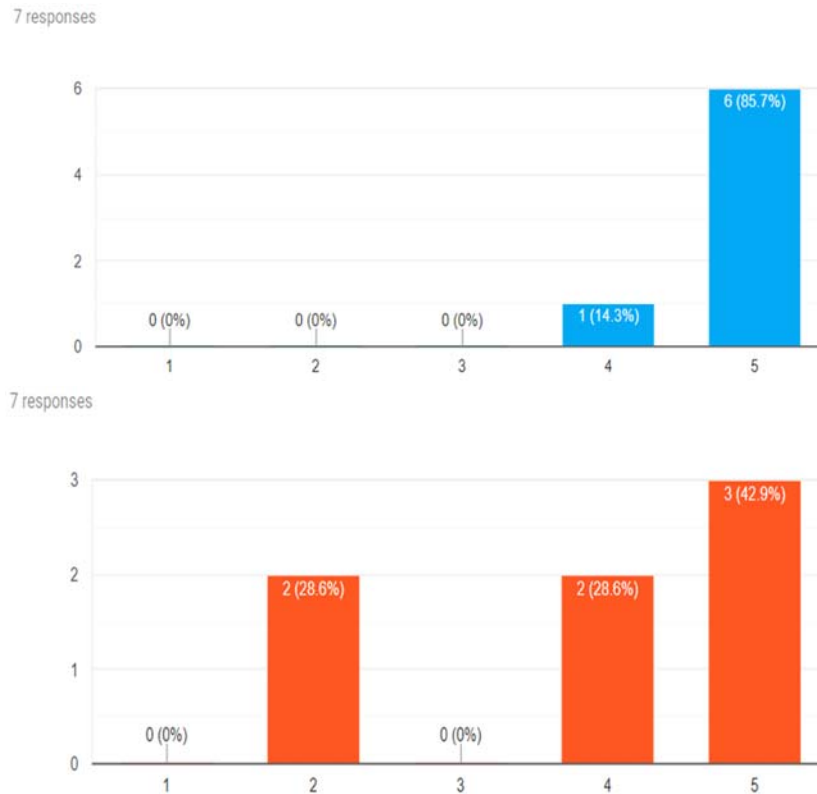


Figure 2: Responses to the questions "Do teachers use modern tools and technology in class?" (Up) and "Are the classes adapted to the students' background in ICT?" (Down) (5-level Likert scale, 5: the best)

Another result, very important from the perspective of managing the SSC program, is illustrated in the graph shown in Figure 3, after (Devedzic & Krstic, 2016). It reveals that a majority of students with BA degrees in social sciences and humanities believe that their employment prospects increase with the skills they get from the SSC program. It encourages the program organizers and the teachers to keep showing employment opportunities and positive examples (of graduates from this study program) in class, as an additional incentive to the students.



Figure 3: Responses to the question "Do you believe that the labor market will recognize the MSc in SSC degree from this study program?"

Cases

The experience with running the SSC program so far includes a number of interesting cases, some of them being very encouraging, but some others being not so pleasing.

Two of the brightest cases include two students enrolled in 2015. One of them, a girl with the BA in philology/languages, has never done any Web development prior to coming to the labs where the teacher has illustrated how to use several free online tools for developing Web sites. The class took about 90 minutes. All the students have got the assignment to use any of these tools to develop a Website with a couple of pages and submit it in 7 days. Figure 4 illustrates her submission – a completely elaborated Website with a dozen of pages, a blog, and a discussion forum, developed with a tool that has not been demonstrated in class at all (!!!), and with the highest Web design and aesthetics standards.



Figure 3: A page from a Website developed by a student who was new to Web development. Exploring the rest of the PLP (<http://goo.gl/pRtJ66>) reveals even more creativity and engagement.

The other case is that of the master thesis of a student with a BA in demography, who has autonomously and comprehensively analyzed the interactions of politicians and their parties on Twitter during the election campaign in Serbia in 2016 (Galjak, 2016). The student has mastered programming in the R programming language (although they don't teach R programming at his faculty where he's received his BA degree) and has made all the analysis of these Twitter interactions developing the R scripts autonomously, with a lot of convincing illustrations. Without going into details of specific tweets, politicians and their parties, the visualizations he has created brilliantly illustrate things like who tweeted about what, how intensively they did it, the overall tone of the tweets, the impact on their respective parties, public opinion, and many more.

On the not-so-bright side of things, it is important to stress different mindsets of both students and teachers who come from social sciences and humanities, and those who come from engineering, ICT and quantitative studies. The SSC program is a quintessentially interdisciplinary endeavor, whereas graduates of social sciences and humanities typically come with social sciences

mindsets. Some of them have trouble following courses in statistics and computing, others have no training at all in concise writing (e.g., in their theses), and some take quite some time to develop the idea of *working* on practical assignments related to a topic in computing, rather than merely *writing* about it. Likewise, when seeking approval to launch this study program from a dedicated university body where the members are teachers representing many different disciplines, the program organizers have run into terminological misunderstandings. It took weeks before the engineering/quantitative terminology used in the initial application for approval was harmonized with that of social sciences and the program got finally approved. It was also difficult for teachers with engineering background to get used to communication with students coming from social sciences who are used to longer debates than these teachers typically practice.

Major Challenges

Although the SSC program has been successful with students so far, and has got great reviews from them, the challenge of *program sustainability* remains. New attractive master programs get accredited and high competition between universities put the program organizers on continuous alert. Until this academic year, the program has received the highest interest and demand from students with BA degree in economy, languages, management and political sciences, but not as high interest from students with BA degrees in other disciplines of social sciences and humanities, Figure 4. The SSC program management has decided to intensify the program promotion with these other potential students.

The *highly interdisciplinary nature of the program itself* is an advantage to many students, but can put problems to others. The analyses conducted so far indicate that more efforts should be put in teaching introductory ICT topics that students of social sciences typically do not master during their undergraduate studies. However, it is in collision with the maximum efforts that can be demanded from students (it is a 60 ECTS program). An alarming warning to this end has come from the recent statistics that, at the time of writing, indicate zero graduates from the generation enrolled in 2016, Figure 5. It is not a good idea for the program to get a reputation of one that takes years to graduate from – on the long run, it can lead to a considerable *drop of interest*, and consequently to *financial issues* and the program can easily become obsolete and fade out eventually.

Luckily, the program management has found part of the solution to these issues. Partnering with employers has already started through student internships and practical placements, which presents *better employment perspective of graduates*. Efforts are also undertaken to introduce more dynamics in *modifying the course contents*, so that the graphs shown in Figure 1 become more even, for the benefit of both the students and the employers' interests. Also, *international cooperation* is very attractive to students of the SSC program, as well as to some teachers. Students welcome classes given occasionally by guest teachers from other countries, and student and teacher exchange programs are getting increasingly popular.

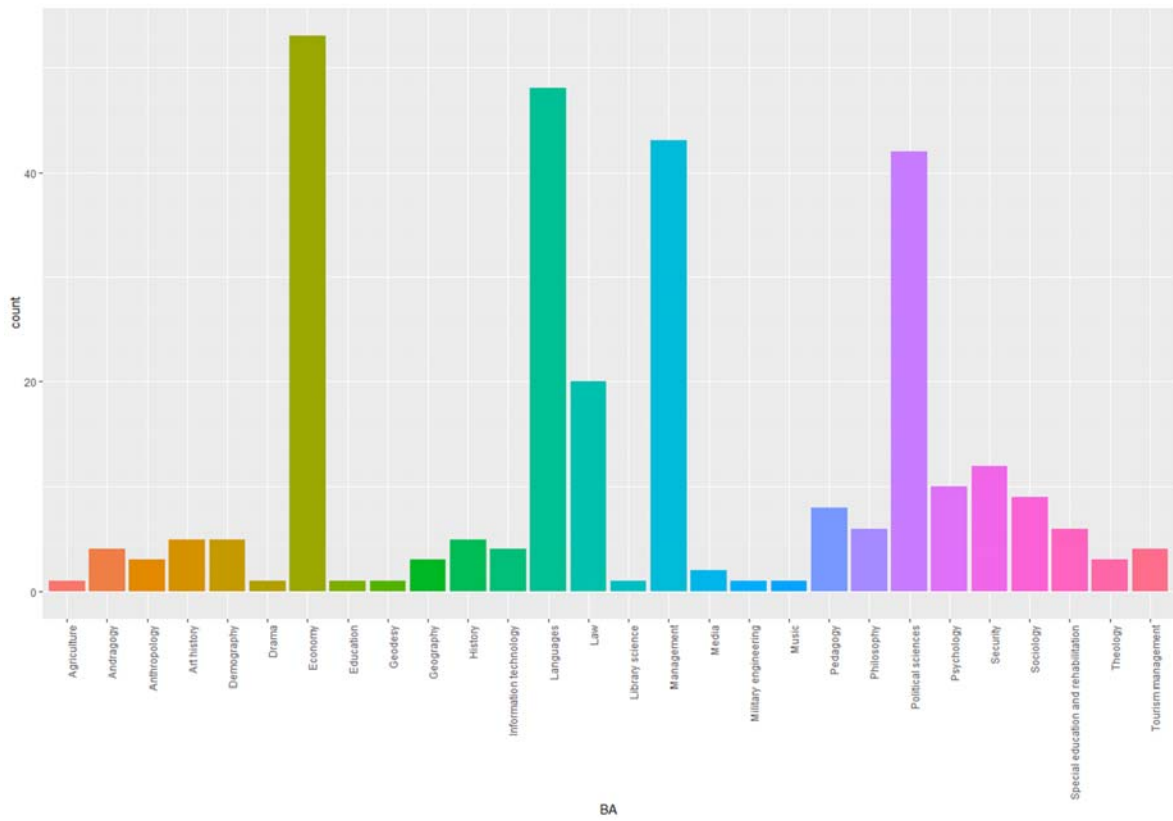


Figure 4: Total numbers of applicants with different previous (BA) degrees (2014-2018)

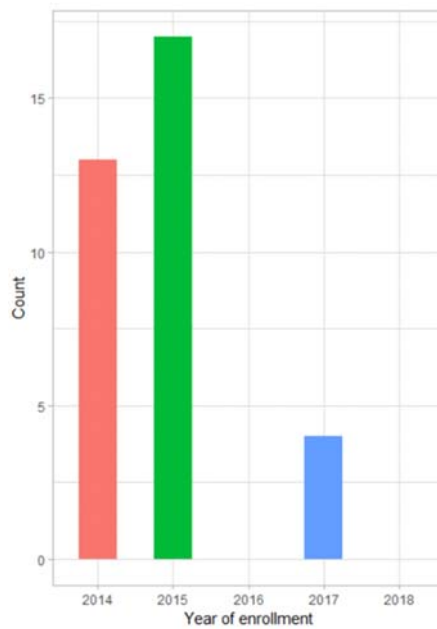


Figure 5: Numbers of graduates from the SSC program over the years

Research Questions Revisited

The experience with year-after-year analyses and the results obtained so far indicate that for a short answer to RQ1, *What does it take for a study program like this to survive on the long run?*, one can use the metaphor "blood, sweat and tears...". Many challenges remain that make such study programs difficult to sustain (economic, financial, different mindsets, employability, and many more). Yet, if "blood, sweat and tears..." are turned into "fresh blood, sweat and tears!", things become more doable. Pairing up new demands from the labor market with continuous changes in course topics, as well as new demands from students with openness and ambitions of younger teachers, can alleviate the problems and lead to a better overall satisfaction of students with such a master program.

As for RQ2, *Is "collective ownership" the way to go?*, the short answer from what the program has experienced so far can be: it depends on who the owners are. Isolated courses with single players (teachers) who do not put much effort in their courses and stick to their "teaching at a faculty" mindset have little success (see Figure 1 again). Contrary to that, good collaboration between teachers from different faculties and openness to "teaching at the university" has proven to be much more fruitful in the case of such an interdisciplinary master program. Including employers and students in the loop by being open to their demands is also essential.

Lessons learned / Conclusions

Rephrasing the famous quote from Phil Alden Robinson's movie *Field of Dreams* (1989), "If you build it, he will come", it is appropriate here to ask "If you build it, will they come?" The experience with the SSC program indicates that the answer is, at best: they *might* come, but only if extreme care is taken of the program. Without careful management, the program is likely to quickly dematerialize and vanish from students' sight. It is up to the program developers and management to decide if "it's better to burn out than to fade away" (N. Young).

Promotion is found to be essential in the case of this study program. Targeted promotion (undergraduate students, younger teachers, student employment services, etc.), almost exclusively through social networking and media (Instagram, Facebook groups, Twitter, dedicated blogs) and not only when the targeted undergraduate students are at the final year of their studies (it might be too late) is used in the last two years in the SSC program and has brought notable increase in the number of applicants (almost 30% higher in 2018 than in 2017). A less obvious strategy used in promoting this program is also to involve the enrolled students in the promotion (to tweet, to author blog posts, to be active in the program promotion on social networks and in social media). As a side effect of this approach, not envisioned beforehand, these enrolled students seem to take their own duties with more efforts – note the number of graduates from the generation of 2017, when the promotion campaigns have started, and compare them to the 0 graduates from the generation of 2016, Figure 5. Personal communication with these students has revealed the important role of them being involved in the promotion campaign.

International cooperation has to be carefully prepared and nurtured. There are always teachers from other countries who are willing to guest lecture at the SSC program, and there are funding

mechanisms for such teaching visits, but experience shows that they are also interested in establishing research collaboration with the hosting university as well. Luckily, once such cooperation is initiated on good grounds, it typically continues.

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