

# WHAT DOES IT TAKE TO ADOPT PORTFOLIO PRACTICES? The Student Perspective

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## Abstract

The objective of a research training process, from the learning perspective, is to acquire a set of basic competences that translate into a high level of professional and technical maturity. The use of a portfolio as a practical tool can help in this process that spans from the collection of information to the shaping of ideas. In this paper we present a practical materialization of the portfolio, a research-oriented example, together with the perception the student gets out of this practice. In conclusion, being successful in such practices is not straightforward. However, the right combination of persistence, rigorousness and feedback, help speeding up the process.

## Workshop Topics

*Autonomous learning; Beyond active learning*

## I INTRODUCTION

Portfolios in a learning environment are commonly used because they provide a means both to assess the students' work and demonstrate the accomplishments of the learning assignments. Learning research is slightly different but follows the same guidelines.

From the technical perspective, the objective of a research training process (PhD studies) is to define a problem and find a solution for it. To do so, the student first needs to study the state of the art of the topic in order to identify what is missing and define a problem statement with enough detail so it is clear what needs to be done and why. The student then proposes a new or alternative element, and provides a justification for what is claimed by means of validation, evaluation, comparisons...

But the most important objective of a research training process is actually learning how to do research, so how to define and solve a problem. This includes mastering and understanding the different research methodologies as well as being proficient

in the highest levels of abstraction of the Bloom Taxonomy [1]. Reaching this advanced way of thinking allows the student to be intellectually autonomous: it is not about knowing everything, but being able to learn whatever it is needed. Achieving this status is not easy and we understand the portfolio as a tool to assist in this process. It is important to highlight the double purpose of the research portfolio as it can be defined as a *practical* tool to work the *conceptual* content.

In this paper we present the student perspective on the adoption of a portfolio practice. The idea is to show the main concerns, barriers and key issues the student faces when applying these practices. We have identified that the main issues the student needs to deal with are the high amount of information that needs to be managed (how to collect it and how to organize it) and how to get feedback from other sources (advisor, team members, experts...).

The portfolio can be seen just as a practical tool to organize notes. But it really is an instrument to keep these notes, work on them, and eventually convert them into a new idea. Therefore the key starting point of all the process is the collection of information (evidences) and acquiring a certain level in the *informal writing* competence [2]. In addition, the communication in order to get feedback is a key factor as well. For the student it is very important to receive comments on the evidences collected in order to avoid wrong paths or refine the perspective. Section II discusses why these elements are so important and how the practicality of the portfolio applies to them.

However, the process to adopt these practices is not simple and many barriers and conditions to success have been identified. Section III presents the evolution (phases) of the student through the adoption of the portfolio practice. In summary, a combination of persistence, rigourousity and feedback help speeding up the process.

## **II MATERIALIZATION OF A RESEARCH PORTFOLIO**

This section describes an implementation of a research portfolio and the main practical concerns the student has faced. The process description is driven by the flow of information through different stages (collection, processing and outcome) and how the communication (feedback) performs as an input in each one of them (see figure 1).

It is important to point out that using any type of portfolio template is dangerous since the essence of the tool may not be understood and the practice just becomes a collection of information stored in a database. It is recommended the student builds the portfolio from scratch and defines it the way that results more comfortable to work with (templates can be used as an initial structure to understand what may be needed).

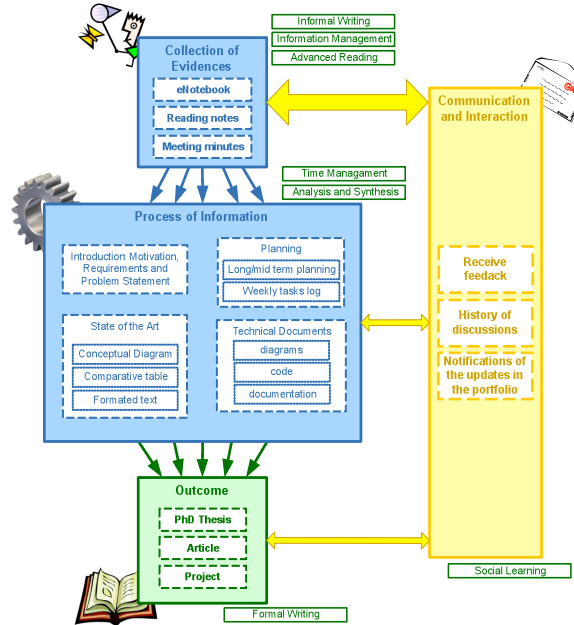


Figure 1. Information flow: from collection to processing

## II.1 Collecting Evidences

The student needs to gather information from several sources and for different purposes: study the state of the art of the concrete topic, get the required background or learn needed tools, or obtain comments from other members of the community. This results in a huge amount of input information.

As it is described in [2], the *informal writing* is a crucial starting point when building a portfolio. The idea is to write down everything in a type of research log (like the classical notebook).

There are many reasons to write down everything. First, expressing oneself in informally written language is a very good exercise for the student and helps understanding and digesting what is being learned. Moreover, written notes act as a kind of additional memory and the student can come back later on, work on them and evolve the ideas behind. In addition, written notes can be shared so others can provide comments. If there is no writing, feedback can never occur.

There are many different sources of information where evidences can be collected from. The most important ones are the reading notes, the meeting minutes, notes on conversations or even a log for isolated ideas that eventually may become relevant. There are different ways to format and organize these collected notes and each one has different characteristics. They can range from the classical handwritten notebook to a more sophisticated electronic computer-based structure such as simple files or

web-based notes applications (see section II.2 and Table 2 for discussion on document formats).

If the inputs are not written, they may be forgotten; even if they are written, the notes can get lost if not stored in a structured repository. This is the reason why the organization of the information is so important. Section II.2 addresses this issue.

## **II.2 Organizing Information**

The basic idea is to organize everything so any evidence that can be collected has the correct place where to be stored. The need for organization highly depends on personal skills but we recommend having a structured portfolio for many different reasons. First of all, memory is limited and the capacity to locate concrete evidence decreases as the amount of stored information grows (an unstructured portfolio is not scalable). It is also recommended to be able to do efficient searches, which is easier in an organized repository. Finally, the student should share the information in order to get feedback, and others will feel more comfortable in a clearly organized structure.

There are three issues to take into account when deciding how to organize the portfolio. First, the type of platform structure needs to be decided. Table 1 shows a summary of the most common options and the relevant requirements. The access to the information and its edition must be quick and efficient. Hence, aspects like an online and/or offline access and the OS platform where we can use them are crucial. Regarding the communication and feedback, the ease of sharing them and an easy printout are important factors to take the decision. The option that best fulfills the requirements is the simple use of files organized in folders in a local computer and using a synchronization software [3] to keep the same files at different places.

Second, the document format of the files is the next point to address. As table 2 shows, the same aspects in terms of accessibility and quick edition are key factors as well. It is important to use a format capable to provide internal file organization like automatic table of contents, sectioning or cross-referencing. So using simple text files is not recommended. In this case the best option is using MSWord format (regardless its low compatibility with open source OS) especially for its quick edition, ubiquity and ease of internal organization.

And third, the communication platform used to communicate with others. Table 3 shows the review of different options. The most commonly used is the email exchange (either single emails or using a mailing list), but it is difficult to keep an organized history (remember the notes are useful to work on them later on) and, for instance, it is not immediate to take a printout of the whole discussion. For this reason the forums are presented as the best option in this case. Concretely, the forum application provided in Moodle [4] meets most of the requirements.

Finally, there is a type of applications very useful for organizing bibliography: the reference managers (see Table 4). Most of them build a database of references in

BibTex standardized format [5] and provide a user interface to interact with such database. Both commercial and open source software are available and most of them provide clients for different platforms. The most important aspects to look at are the possibility to link the references with local (pdf) files and to directly add text notes stored in BibTex field specially designed for this purpose.

Table 1. Type of Documentation Structure

	Cross Platform	Online Storage	Online access	Offline access	Shared	Quick edition	Easy Printout
Web-based notes app.	Yes (web)	Yes	Yes	No	No	Yes	No
Client-based app.	Yes	Yes	Yes	Yes	No	Yes	No
Wiki	Yes (web)	Yes	Yes	No	Yes	Yes	No
Own files with SVN	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2. Document Format

	Cross Platform	Online Storage	Online access	Offline access	Shared	Versioning	Quick edition	Easy Printout
MS Word with SVN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plain text with CVS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Latex with CVS	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Wiki	Yes (web)	Yes	Yes	No	Yes	Yes	Yes	No

Table 3. Communication Platform

	Cross Platform	Online access	Offline access	Quick access	History repository	Easy Printout
Moodle Forums	Yes (web)	Yes	No	Yes	Yes	Yes
Mail	Yes	Yes	Yes	No	No	No
Mailing List	Yes	Yes	Yes	Yes	No	No

	Cross Platform	Free License	Online access	Offline access	BibTex format	PDFs links	Quick edition	Intergr. notes
RefWorks	Yes (web)	No	Yes	No	Yes	No	No	Yes
BibDesk	OSX	Yes	No	Yes	Yes	Yes	Yes	Yes
Papers	OSX	No	No	Yes	Yes	No	Yes	Yes
JabRef	Yes (java)	Yes	No	Yes	Yes	No	Yes	Yes

Table 4. Reference Manager

## II.2 Processing and Shaping Ideas

Once the information is collected and organized, it needs to be processed in order to shape the ideas, come up with comparisons, relate topics... From an abstract point of view, the objective is to create the ‘big picture’ of the defined problem. In order to create it, some smaller ‘big pictures’ can help in addressing a research problem. These can be independently organized in different working documents where the processed information is used. Some of these basic working documents are the ‘Problem Definition’ (it evolves as the problem is better understood), the ‘State of the Art’ (related work and how it relates to the problem defined), several ‘Technical Documents’ (concrete topics directly related) and ‘Planning’. We want to emphasize this last because usually it is not considered as an outcome of processed information. Actually, note that a new evidence like a new algorithm may result in creating task to deeply understand it, implement it, compare it to others...

## IV GENERALIZATION OF THE PROCESS

This experience has also been useful to identify the main elements to take into account in this process in order to make it successful. This translates into different distinguished phases and some barriers or conditions to keep advancing in the process (see Figure 2 for a graphical representation).

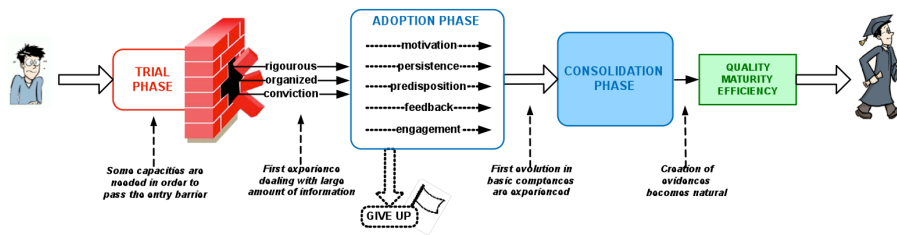


Figure 2. Generalized portfolio adoption phases and barriers

When the student is first proposed to work in a portfolio the first feeling is usually quite negative. The student does not even know what to start with and the practice is seen as documentation, hence overhead. Actually there is an important, and practical, need to organize the large amount of information and the reason why the student just understands the portfolio as a documentation overhead is because the essence and the utility of the tool is not yet understood. We call this first stage the *trial phase* because it is during this first step when the student tries to arrange the platform to work with. It is clear that a high sense of organization is a required skill in order to pass this first barrier. Others like rigorosity in the work and conviction that the tool will eventually be useful are also required to enter the next identified phase.

The *adoption phase* is usually where the student spends most of the time and it is clearly characterized by the big change of mind realizing that the portfolio really helps in more than just organizing information. The idea is to transform the portfolio from a simple repository of information where the documentation is seen as an overhead, into a useful tool to evolve in the understanding of the topic. There are many factors that can help speeding up this evolution. The combination of persistence, patience and motivation helps to keep working on the portfolio and make it a parallel mind. This relates to the fact that there is not feedback if there is no information to give feedback on. An engagement from both sides is also needed: the student is committed to use the portfolio as the main tool, and the teacher (or advisor) is also committed to give feedback on what the student writes.

The transition between *adoption* and *consolidation* phases is quite blurred but it can be interpreted as the moment when the student starts realizing an improvement in the basic competences. At this point it is just a matter of keep doing with the same working methodology and things will eventually work out. The basic competences are continuously practiced and improved until the point when high maturity, both technical and professionally, lead to high efficiency and high quality work.

## VII CONCLUSIONS

The successful adoption of the portfolio practices is not a straightforward process. From a general perspective it requires of some personal skills such as persistence and rigourousity to be applied to aspects like general organization or but also concrete technical details.

From a practical point of view, the student needs to feel comfortable with the tool being used as portfolio. The recommendation and use of templates is dangerous because the imposed structure may go in the opposite way of working of the student and the essence of the portfolio is then difficult to understand.

An important key in any learning process is to follow the right path and learn the right things. Therefore a very important issue is to realize how important and valuable the receiving feedback is. External inputs either from technical experts, the student advisor or other colleagues, really make a difference. For this reason the student must be committed to use the portfolio almost as a second mind where the evidences and concepts are expressed so valuable feedback can be provided.

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