RIDU Revista Digital de Investigación en Docencia Universitaria
e-ISSN: 2223-2516

V. 13, nº 1, ene-jul | PERÚ | 2019
https://doi.org/10.19083/ridu.2019.735

RESEARCH ARTICLE

Qualitative Differences between Research Training and Formative Research in Undergraduate Students

Erika Egleontina Barrios González*
http://orcid.org/0000-0001-6214-0779
Doctorado de Psicología del Centro de Investigación Transdisciplinar en Psicología, Universidad Autónoma del Estado de Morelos, Morelos, México

Ulises Delgado Sánchez**
http://orcid.org/0000-0002-4318-0238
Centro de Investigación Transdisciplinar en Psicología de la Universidad Autónoma del Estado de Morelos, Morelos, México

Eduardo Hernández Padilla***
http://orcid.org/0000-0003-4269-9182
Universidad Autónoma del Estado de Morelos, Morelos, México

Citar como:
Barrios González, E. E., Delgado Sánchez, U. & Hernández Padilla, E. (2019). Diferencias Cualitativas entre Formación Investigativa e Investigación Formativa de Estudiantes Universitarios. *Revista Digital de Investigación en Docencia Universitaria*, *13*(1), 52-63. doi: https://doi.org/10.19083/ridu.2019.735

Recibido: 30-04-18; Revisado: 12-11-18; Aceptado: 25-01-18; Publicado:

Abstract

Traditionally, training in research at the universities has been transmitted as theory (research training, RT); however, the nature of this knowledge benefits from a more practical approach (formative research, FR). The aim of this research was to compare the qualitative differences between these two types of approach to training in the research process. Four focus groups were created: 2 RT and 2 FR. Sixteen categories corresponding to the quantitative research process were chosen for the script, and a total of 30 Psychology students participated. Significant conceptual differences were found regarding the research process. FR students tend to have more clarity regarding concepts, take a larger number of ethical aspects into consideration, and develop an identity as researchers. They prefer qualitative research because of the difficulties they have with statistics. There is a linear view of the research process in both, and change-generating dynamism is perceived as a problem. In sum, the FR students acquire an overview of the process that is perfected with experience, in addition to contributing to an ethical vision and acquiring an identity as researchers, which shows advantages over the other type of training.

Keywords:
qualitative research, research skills, student research, undergraduate students

*email: erika.barrios.gonzalez@gmail.com **email: ankhpsy@gmail.com ***email: eduhpad@gmail.com

Diferencias Cualitativas entre Formación Investigativa e Investigación Formativa de Estudiantes Universitarios

Resumen

Tradicionalmente la formación en investigación en las universidades había sido transmitida de manera teórica (formación investigativa, FI), sin embargo, la naturaleza de estos conocimientos se beneficia de un enfoque más práctico (investigación formativa, IF). El objetivo fue comparar las diferencias cualitativas entre estos dos tipos de enfoque para la formación en el proceso de investigación. Se formaron cuatro grupos focales: 2 FI y 2 IF. Para el guion se eligieron 16 categorías que correspondían con el proceso de investigación cuantitativa. En total participaron 30 alumnos de la carrera de Psicología. Se encontró que existen diferencias conceptuales significativas con respecto al proceso de investigación. Los estudiantes IF tienden a tener mayor claridad en los conceptos, considerar más aspectos éticos y desarrollar una identidad como investigadores. Prefieren las investigaciones cualitativas debido a las dificultades que tienen con la estadística. En ambos existe una visión lineal del proceso de investigación y el dinamismo que genera cambios lo perciben como un problema. En conclusión, los estudiantes IF adquieren una visión general del proceso que se va perfeccionando con la experiencia, además de contribuir a una visión ética y a adquirir una identidad como investigadores, lo que muestra ventajas sobre el otro tipo de formación.

Palabras clave:

investigación cualitativa, habilidades investigativas, investigación estudiantil, estudiantes universitarios

Diferenças qualitativas entre formação investigativa e pesquisa formativa de estudantes universitários

Resumo

Tradicionalmente a formação em pesquisa nas universidades costumava ser transmitida de forma teórica (formação investigativa, FI); no entanto, a natureza destes conhecimentos beneficia-se de um enfoque mais prático (pesquisa formativa, PF). O objetivo deste estudo foi comparar as diferenças qualitativas entre estes dois tipos de enfoque para a formação no processo de investigação. Formaram-se quatro grupos focais: 2 FI e 2 IF. Para o roteiro selecionaram-se 16 categorias correspondentes à pesquisa quantitativa. No total participaram 30 alunos do curso de Psicologia. Segundo os resultados, existem diferenças conceituais significativas a respeito do processo de pesquisa. Os estudantes IF tendem a ter maior clareza nos conceitos, considerar aspectos mais éticos e desenvolver uma identidade de pesquisadores. Preferem as pesquisas qualitativas, devido às dificuldades que têm perante a estatística. Em ambos existe uma visão lineal do processo de pesquisa e o dinamismo que gera mudanças é percebido como um problema. Em conclusão, os estudantes PF adquirem uma visão geral do processo que se aperfeiçoa com a experiência, além de contribuir com uma visão ética e a adquirir uma identidade como pesquisadores, o de demonstrar vantagens em outro tipo de formação.

Palavras-chaves:

pesquisa qualitativa, habilidades investigativas, investigação estudantil, estudantes universitários

Introduction

There is currently a growing interest in integrating students into research experiences at increasingly younger ages. Although the subjects of methodology and statistics have been part of the university curriculum for a long time, it is believed that knowledge without practice has little impact on the learning of these types of concepts. This focus on practice—on learning by doing—corresponds to what is known as education or formative research, different from traditional research training, which placed a greater emphasis on theory than on practice. According to Roncacio and Espinosa (2010), formative research "means learning to conduct research by researching, learning from acting in a specific context, where it is possible to explore needs in real contexts of society and transfer the knowle-

dge learned" (p 155). Research training (RT) focuses on providing a basis for understanding and managing fundamental methodological processes. While formative research (FR) also provides a methodological basis, it is intended to promote a research culture and the training of researchers (Von Arcken, 2007).

This interest in promoting research in university students is based on the multiple benefits this practice represents for them. In a study by Lopatto (2007), he found that students gained better insights into the research process and that 83% of them felt more confident regarding their abilities. Moreover, this practice improves their tolerance for frustration and autonomous work. Lopatto pointed out that such programs may encourage students to take an interest in research; however, a bad experience can also result on them giving up on that idea, even if they initially showed an interest in the science. The impact of the experience has been addressed in other studies such as that of Bauer and Bennett (2003), who conducted research involving students from different bachelor's degrees to identify the differences between students with and without research experience. They were divided into three groups: (1) Students who participated in the university's research program, (2) students with self-reported research experience, and (3) students with no research experience. The two groups formed by experienced students reported greater benefits in their training compared to the third group, and this fact was directly related to the amount of research in which they had participated. Students in the research program scored higher on the scale than the other two groups, especially in the areas of oral communication, independent information collection, leadership, understanding of scientific findings, critical analysis of the literature, personal professional project, and curiosity development. Students in the program reported a greater interest in pursuing graduate studies, especially those without experience. These authors state that the comparison between this type of groups of students allows to better visualize the impact of practice on research learning.

For Kinkead (2003), the importance of research for university students lies in increasing their motivation to learn, especially when they are able to choose the research topic and make decisions within the process. Research at a Bachelor level contributes to reduce attrition, as well as to strengthen an ethical vision of their professional practice. It promotes critical thinking, problem solving, and oral and written communication skills (Chopin, 2002). In the study by Myers, Sawyer, Dredger, Barnes, & Wilson (2018), they point out that these experiences allow for new learning, approaching researchers, and destroying the erroneous ideas regarding research. However, most undergraduate students have been poorly trained in the research process, so they sometimes cannot support more elaborate tasks because they lack the essential knowledge.

These shortcomings start to show throughout the research process, from the choice of the topic to the writing of the report. In a study, Hall (2003) points out that one of the first problems presented during the research is that the students do not know how to delimit the subject of study; in addition, they lack the effective strategies for searching information or discerning reliable sources. For example, they do not see a difference between what they find in a Google search and in a database such as PUBMED. In terms of data analysis, there is a great resistance to quantitative research caused by the aversion to statistic reported by several studies. For Ruiz (2015), this resistance to statistics is due—among other things—to the fact that they consider that it will not be applied in the future, and a poor self-perception, that is to say that they do not consider themselves as capable of passing this type of tests. In addition, in the great majority of cases, the students of careers such as Pedagogy, Education and Psychology do not know that the career requires the use of mathematics. Finally, communicating results or writing the report is often one of the biggest problems for students doing research: They present issues with grammar, spelling, and syntax, not just for technical writing, but even for basic writing skills (Fallahi, Wood, Austad, & Fallahi, 2006).

For Walford (1991), the main problem with research training is that the actual version of scientific practice is not conveyed; instead, students are given a linear view of research as a se-

ries of well-planned steps to follow, which never present any difficulties. Teaching research in an unrealistic way means that when the student encounters the potential difficulties in any research, these problems are considered as a personal deficiency—due to a lack of preparation, knowledge or experience—and not as something inherent to research. According to Sternquist, Huddleston, & Fairhurst (2018), the best way to achieve a real learning of the research process is through practice, which allows the student to develop the so-called *inside look* into the research; this experience is enriching when it is part of a reflective process; and we may highlight that the benefits are not only for the student, but for the professors and even for the school. For Shachter (2003), this must take place within a framework that addresses the ethical aspect of research, since students will have to conduct their projects in an appropriate manner. He considers that this type of information is indispensable in the training of students in research programs. It is essential that, although being young researchers, they build an identity as researchers and develop their work in a professional manner.

Formative research refers to a set of learning strategies of inquiry, exploration of reality, and construction of knowledge; it is action- or practice-focused research that seeks not only a real approach to research, but conducted under strict scientific standards, suggesting the participation of students in already consolidated research groups (Restrepo, 2003). However, this participation is not the only way of implementation; there are also curricular or extracurricular programs, which may be face-to-face or online. The characteristic shared by all these modalities is the value of research experience in its formative character (Velandia-Mesa, Serrano-Pastor, & Martínez-Segura, 2017).

In their meta-analysis of 256 studies, Linn, Palmer, Baranger, Gerard, & Stone (2015), found that this type of research immersive experience helps students to build an identity as researchers. They point out that, although most research works use instruments with Likert scales, the use of interviews and journals offers the double benefit of not only collecting the experiences of students in research, but also of supporting them to connect with the vision of themselves as scientists. This identity as researchers is related to the duration of their participation in the projects: Those students who take part in them for more than three semesters have greater possibilities than those with short stays. In the light of these studies, it is remarkable that FI and IF influence the learning of different competencies in university students; however, there is no information available that directly compares the results of both types of training. Such a comparison—initially of a qualitative type—would allow to have a greater certainty in the design of the formative processes of university students, in the programs that are supported in an important way by empirical research.

The aim of the present study was to describe and compare the qualitative differences in the methodological knowledge of university students with research training and formative research.

Method

Design

The study presents a qualitative approach, with a descriptive scope phenomenological design.

Context

The study was conducted at a private university in the state of Morelos, specifically in the Psychology study program. The system used by the university is 10 terms, which have a total duration of 3 years and a half. This system makes possible to speed up study time at the expense of sacrificing thematic content, which has later caused problems in student education. In order to improve these deficiencies, a group of professors—on their own initiative—started a project to promote group research projects, aiming at improving not only the training, but also the motivation of students. This created an environment where students with a research background coexisted with another group of students with an emphasis on formative research.

Participants

A convenient non-probability sampling was ca-

Table 1
Dimensions and Indicators of the Focus Group

Dimension	Indicator
1. Problem Proposal	(a) choice of topic (b) search for information (c) rationale (d) objectives (e) variables (f) hypothesis
2. Method	(g) research design (h) data collection technique (i) sampling (j) validity (k) reliability (l) procedure
3. Results and Findings	(m) selection of statistical tests (n) results (o) findings (p) schedule

Source: Own elaboration

rried out in the Psychology undergraduate program at a private university in the state of Morelos, Mexico. A total of 30 students (26 women and 4 men)—with an average age of 20 years—participated . They were students of the second (43%), third (40%), and fourth year (17%) of the program. They were divided into two groups: Students with research training (n=13) and students with formative research (n=17). Students were required to have taken the Research Methodology course to be included in the sampling. In the case of the second group, students were also required to had developed a research project and had presented it at a national or international congress.

Data Collection Technique

The data collection technique chosen was the focus group. A guide was designed including three dimensions and 16 indicators (see Table 1), based on the process of qualitative research, since it is the one in which students present the greatest difficulties. The guide structure was prepared based on the review of the literature and was validated by three judges before its application.

Four focus groups were established: Two groups formed by students with research training and two groups formed by students with formative research. On average the administration took 90 minutes per group.

Procedure

First, the guide was designed using the dimensions and indicators related to the research process. Subsequently, university students were invited to participate in the research; a total of 37 students accepted the invitation. Four focus groups were formed: two made of students with research training (RT) and two made of students with formative research (FR). Five students from the RT group, and two from the FR one, did not attend, resulting in a total of 30 students. Participants were asked to give an informed consent to record the sessions. Audios were transcribed and citations were analyzed in a data matrix.

Data analysis

The recorded sessions were transcribed in Word, and then the extracts belonging to each indicator were selected. They were organized by indicator and participants in a data matrix for cross-analysis of the data.

The Shenton criteria (2004) were used to determine the integrity of the qualitative analysis, specifically the verification of members and triangulation of data, which allowed to assess the credibility and reliability of the data.

Results

The results have been organized by dimensions. In each category, the results of the students with research training (RT) were presented, followed by the results of the students with formative research (FR).

Dimension 1: Problem Proposal

a) Choice of Topic:

In the case of students with research training (RT), they consider that the topic should be related to their interests and produce a social impact as well. However, the topics are often very broad, and they present difficulties when delimiting them.

> "...well, for me, a project must be chosen based mainly on the areas of interest, so that I will enjoy conducting the research and do it with more enthusiasm. Above all it has to produce an impact on society, so that this project is visible, and it creates a benefit for society, so that there is a change." (Participant 13)

In the case of students with formative research (FR), they consider that the choice of the topic should arise from their own interests, and that it should not be imposed by their advisors. It is difficult to choose the topic when dealing with large groups, as it is difficult to reach an agreement. Students are able to shape their research based on their specialization interests in the future.

> "...in our case it was because a classmate suffers from this disease, the project addresses quality of life in patients living with type 2 diabetes, and it was because of this situation—her dealing with this disease—that we chose this topic." (Participant 15)

b) Search for Information

Only a few FI students are able to recognize specifically which are the sources where they can obtain reliable information; there is a general notion of "valid sources" without knowing what they would be or what characteristics they should have.

> "Well, when it comes to information, I think that most of us go online, but I think that's the problem: Sometimes we don't have—at least I don't always have—the correct websites, and then I prefer to ask other people about books, authors—I don't know—who could support us with some previous studies of their own. (Participant 2)

IF students have basic tools to search for information. They know the importance of citing to avoid plagiarism, although they recognize that the proper management of APA standards is one of their greatest difficulties. They believe that not knowing English limits their access to information.

> "As for the search for information I think there are no issues, because sometimes it is facilitated when you find an author or a theory and from there you start looking for more and, well, you are already finding information. As for the APA style citations and all of that, well, I think it's still a little bit complicated because sometimes there is one or another data missing so sometimes it gets kind of complicated, but as you gain experience, I think that part becomes easier." (Participants 25)

c) Rationale

Students with FI have a general idea of the concept of justification; however, the definitions are often tautological. In some cases, there is confusion with the introduction, the theoretical framework, or the findings. They recognize that—although having a general idea—they do not know what the justification involves.

> "...justification is like presenting a conclusion on the topic you're studying and including the authors of the books you read for that project." (Participant 1)

IF students have a general idea of the research justification but are not clear about what elements it should contain. In general, writing is the greatest challenge they have to face when developing it.

> "...I think the complicated thing about justification is to capture what you really want to say, and, well, once I wanted to carry out a project, and I didn't agree with my professor, because she said that the justification had to be supported by a previous

supporting work conducted by an author. The complicated thing for me was to understand why I had to include an author, if it was my own work! [laughs] I could not understand that part well, and later, as you gain experience, you understand that it's important, you can't bring it out of nowhere." (Participant 25)

(d) Objectives

RT students are not clear about the purpose of the objectives or how to write them. The objective is confused with the justification or the method. Definitions are often tautological and unclear.

> "...because we also look for what we want to research, what is the general objective we want to reach, what conclusion we want to draw by conducting our research." (Participant 12)

Although FR students have a general idea of the research objectives, there is confusion between the general objective and the specific ones. They also understand that there is a dynamism in the research process that modifies the initial idea; however, rather than understanding it as a natural process of research, in some cases, they consider it as a problem.

> "...I feel that writing the objectives gets complicated—especially when you're starting out—because maybe in those high school experiences it's like whatever, right? I write whatever I want, but no, it has to have a certain structure; it has to include a verb in the infinitive form. I feel it's actually like the basis of the research, because it's the little path you're going to be following, and all of a sudden, if the research takes a different turn, it's like: Hey, come back here!" (Participant 27)

(e) Variables

In RT students, there is a vague and often incorrect notion of what a variable is. They often confuse or ignore the difference between dependent and independent variables.

> "...I think it is like your opinion regarding something that already exists. How is that called? When it's a law, a theory that we saw in the class... A dependent variable is like external, and the independent variable is like of oneself, something like that." (Participant 2)

FR students understand the concept of variables; however, they struggle to differentiate between the dependent and the independent variables. They acknowledge that in class, and when doing exercises, it is easy for them to recognize each one, but once in practice it becomes more difficult to do so.

> "...it gets too complicated for me, because in class or in theory you say: Ah! It's very easy! It's like that and so on... However, at the moment of applying it, you forget everything, like: Which one affected which one? or Which one didn't? Then it gets too complicated for me." (Participant 20)

f) Hypothesis

Most RT students do not know this concept. In the few cases where they do know it, the notion is ambiguous or incorrect; it is confused with the research question or objective.

> "...for me, the hypothesis would be like a myth that you don't know if it's true, but sometimes in your research you're going to quote-unquote verify if it's based on something true or not." (Participant 3)

For FR students, there is a great deal of confusion regarding the concept of hypotheses; in some cases it is confused with the research's objectives. It is not clear in which type of research it is used and what its role in the research would be.

> "...when you propose your hypothesis, it is there where you want to get to. As for the hypothesis and our results, they have always agreed... I think so., However, what do we do if our hypothesis does not agree with the result? I just thought of it." (Participant 13)

Dimension 2: Method

(g) Research Design

RT students confuse approach with research design. Most are unaware of the purpose of research design or what it involves. Although they know some design types, they do not know how to distinguish among their applications.

> "...does it refer to quantitative, qualitative,

> and mixed, perhaps? Experimental, pre-experimental, phenomenological... there is another one, right? There are four of them. There are many of them. Well, I can't learn them all, but I have an idea. However, I feel that we don't have the vision, and we also lack the understanding of when each one should be used." (Participant 10)

FR students find qualitative research designs clearer and simpler than quantitative ones. In general, there is no notion of the purpose of research design.

> "...As our projects have been qualitative, and we have used the phenomenological design, I really understand it, but I think that in a quantitative type I would struggle to choose which design to use." (Participant 18)

h) Data Collection Technique

Not all RT students understand how the information is collected for a research work. A great importance is given to statistical analysis, although they do not know the process to use to this end. They do not know the criteria to be followed to select an instrument or a technique.

> "...for me it is like any method that we could know–even make up—that involves statistics; we could also look for other ways. It is where you find information." (Participant 2)

FR students consider that choosing a data collection instrument is difficult, as they know that it must comply with a series of characteristics such as standardization, being directed towards that population, etc. Professors are usually the source where the instruments are obtained since those found on the Internet do not meet the necessary requirements and the university does not provide enough instruments.

> "...the hardest thing is to find a test that measures what you need, and if it does measure it, that it is aimed at the population you're working with. It is not the same to work with children than with adults, so sometimes there are concepts that children will not understand or that are not yet related to them. Then it is going to get complicated, and the test has to be standardized because it is not the same to work with a child from here in Mexico than to work with one from Europe; it is a very different culture." (Participant 20)

i) Sampling

RT students have a very general notion of sampling; they do not know the types of sampling or how to define the sample size.

> "...for me, sampling is to get information, well, by researching, and with a certain number of population or so, and to get the information you need." (Participant 6)

FR students have a general idea of what a sampling is and its types. However, there is a belief that a large sample ensures the reliability and/or validity of the research. There is also an ethical stance towards the participants' benefits, so they feel that working with small samples ensures that they can give something back that is useful to participants.

> "...I think that within the sampling there are two big types: not probabilistic and probabilistic, and I believe that one of them is used in the quantitative part, which is the one that I find very difficult, because you have a universe, and from that universe you have to select like a certain amount according to the universe. You can't select as you want... for example, if you feel like selecting about 100 people, but it has to be done by using statistics, and sometimes—I don't know—it gets complicated for me to understand how I have to select the specific universe for this type of sampling." (Participant 16)

(j) Validity

In the case of RT students, they acknowledge that they confuse or do not understand the research validity concept. They say they confuse it with reliability and, in some cases, use these notions as synonyms. The types of validity that exist are unknown, and it is often attributed to statistics the ability to determine the validity of a research.

> "...so once you finish the research work, there are certain kinds of people who validate it, right? I feel that it sounds even like advertising, anything where you are told that it has validity and reliability, right? So

> I think it is that, when certain types of people that already have, well, a higher level, validate your research. (Participant 2)

FR students also confuse validity with reliability, although they better understand these concepts. The knowledge of the methods to obtain both is related to their research and focuses on the validity of the instruments, rather than the validity of the research. They consider that, in this sense, quantitative research is stricter than qualitative research.

> "...the validity means that the instrument measures what it has to measure, and it was obtained through a program that was the SPSS." (Participant 28)

k) Reliability

RT students are generally unaware of this concept of reliability, and those who know it think it is achieved through statistics, although they do not know how specifically.

> "...what comes to my mind is the concept of when you are conducting research and do your surveys—like when you give the survey to the person and they answer it, to see if there is a certain level of trust—so that they may properly answer it, and not just do it carelessly, but according to the questions being asked." (Participant 3)

FR students have a deeper knowledge of the use of Cronbach's alpha, but most do not know other techniques for obtaining reliability. In some cases, they confuse validity with reliability.

> "What I remember about reliability is that the research always has to measure the same across the Cronbach's alpha, which goes from 0.5 to 0.9, and the closer you get to 0.9 or 1, the more reliable the instrument is". (Participant 15)

l) Procedure

RT students confuse procedure with process. They have a general idea, but they do not know which aspects should be covered and what the purpose of this section is.

> "...I understand the procedure as how to start planning the research topic first and based on the theoretical framework, and to give each concept, topic and subtopic continuity, so that it is a monitorable process." (Participant 5)

FR students consider the procedure as the simplest part of the research. They consider that writing is a very important skill to be able to develop this section.

> "...as I'm a bit obsessive, that part doesn't get complicated for me; it's to write down what was done or what is going to be done when starting the project. Only maybe the writing part is a challenge." (Participant 23)

Dimension 3: Results and Findings

(m) Selection of Statistical Tests

In general, RT students do not know data analysis; it is attributed—in a general and ambiguous way—to statistics without getting to understand it in depth. There are some notions of basic statistical analysis without understanding its function or purpose.

> "...I think that in order to get statistics you could also get some bars out of the information you have; prepare some bars, either for women or men, separately, or both together." (Participant 4)

In general, FR students acknowledge the importance of statistics, but at the same time they present a resistance to their use, sometimes even preferring to conduct qualitative research just for not using statistics. None of the participants felt up to conducting an adequate statistical analysis, even if they had experience with quantitative research.

> "Well, statistics is the basis of research, but it's very complicated and many times, well, we have that idea... Well I am speaking for myself, because I used to prefer a quantitative thesis to make it faster, but when you're doing it you want to rip out your eyes, because it really isn't... And I definitely think statistics is not considered as something positive by psychologists; it's something we hate quite a lot. (Participant 25)

n) Results

RT students have a general idea of the wording of the results, although they are limited to the presentation of the quantitative approach. There is no notion of the research's discussion.

> "...the results are like the findings achieved by all your tests or workshops that you applied in all your research projects. As for the other one [discussion]... I don't know." (Participant 9)

Some FR students from lower levels struggle to differentiate between results and findings. They consider writing as a necessary skill to be able to develop this section. They think that the discussion is the most difficult part; and the lower grade students are not familiar with this concept.

> "...yes, I am very clear about the difference between results and conclusions. I think that's one of the most valuable parts of the research—your results—because it's like being able to say: I conducted all of this work, and in the end I achieved this. I reached this through all the effort and all the time I devoted to it. Actually, for me this is the most valuable part, the most important, the one you use to represent all your research in a general way. I think that if you are very clear about what you're going to do, and in the end you can prove it, well, it is one of the best satisfactions you can have as a researcher (Participant 24).

(o) Findings

The RT students consider the findings to be a summary of the research, where the data obtained from the instruments is reflected. There is no mention to the contributions of the research, the limitations, or the generation of knowledge.

> "...the findings are like the summary of the entire research". (Participant 8).

The FR students, in some cases, confuse the findings with the discussion. They consider that the findings should conclude the research and present its contributions. They find it easier to write than the results.

> "...the findings show like—based on these results—what does that population need or what was generated through the whole research process that you conducted." (Participant 30).

p) Schedule

Although RT students have a general idea of the schedule—such as organizing research over time—they are not clear about what elements it should include.

> "...I see the schedule as a monitoring process, or dates, or a timeline--I don´t know—something like that, regarding the topic of your research." (Participant 5)

The FR students consider that it is easy for them to structure the schedule, but that the challenge is to comply with the deadlines established by it. This difficulty in meeting deadlines may be caused by a lack of organization or institutional issues.

> "...regarding the schedule,, well, it is very easy for me, because you write your steps or what you have to do. On the other hand, carrying it out is not easy for me, because—I experienced this when doing my thesis--by this time, I should be more than halfway through, and, well, actually I have not even applied the surveys. It is easy to write, but not to carry out; it's not easy for me personally." (Participant 21)

Discussion

In general, there are differences between research training (RT) students and formative research (FR) students. The RT group tends to have more general and theoretical notions of research, while the FR group has clearer notions of concepts, although this does not imply the absence of errors or confusions. There are some differences and similarities in the research concepts.

As for the choice of topic—as suggested by Kinkead (2003)—both groups feel more motivated when they can choose the research topic; on the contrary, they feel discouraged when the tutors impose the research topic. He observes that the students in the FR group are able to better delimit the topic and, in many cases, they select it based on their professional profile or their postgraduate project, something that was not observed in the TR group. As to the search for information, the RT group agrees more with what was reported by Hall (2003), as they do not have the tools to carry out effective information searches. On the other hand the FR group has difficulty with the APA format,

and they consider important to learn how to cite in order to avoid plagiarism.

The function of various parts of the research process is unknown. For example, RT students know that they must choose a research design, but in most cases they do not know what the purpose is, so it becomes an element of a recipe. Agreeing with that Walford had already pointed out (1991), both groups show this linear vision of research; only students who have participated in two or three research works understand research as a complex process. The students of the RT or FR group with little experience consider that research should not present problems or errors, and that if these appear they are due to design or execution issues and not because they are inherent to the research process.

Students find several parts of the process difficult because of their writing skills, e.g., the rationale or results. The difficulty lies not in understanding what is to be written, but in being able to put their ideas on paper. These writing problems are reported by both groups and agree with the findings by Fallahi et al. (2006).. For the RT group, this is accentuated because they are not familiar with scientific texts, so technical writing seems very difficult to them.

In the FR student group, there is a more ethical view of the research process; they have better notions of requirements such as informed consent letters, feedback, anonymity, among others. In the RT group there was no reference to an ethical view of research. Both groups show a concern for giving something back to society; this fact has been observed in students from the humanities programs. Secret, Ford, & Rompf (2003) point out that students with an interest in social work tend to find research more attractive, for both groups. On the other hand, students with a fear of statistics tend to be less interested in research.

This fear or dislike of statistics is something that was found in both groups, something that agrees with the research conducted by Ruiz (2015). Students prefer qualitative research because it does not involve statistics, although ironically many more qualities are attributed to quantitative research. It is believed that qualitative research follows fewer rules and is, therefore, easier. Some recognize having considered changing their research topic just for not conducting quantitative research.

Finally, the identity as researchers is something that was only observed in the RT group; although they accept their limitations; participating in congresses as speakers has empowered them. They consider that their research is as valuable as that of any researcher, although they find that when they attend events, their projects are not taken as seriously as those of graduate students.

In conclusion, formative research allows for a deeper understanding of the concepts, and although it does not seem to be sufficient to eliminate some prejudices and misconceptions regarding research, it shows significant advantages over research training. However, formative research requires an investment of economic and human resources, which is why research training is usually chosen in most universities. It is expected that this research will contribute empirical evidence for the effectiveness of this type of approach, which will enable more universities to migrate to this type of teaching.

References

Bauer, K. W., & Bennett, J. S. (2003). Alumni perceptions used to assess undergraduate research experience. *The Journal of Higher Education*, *74*(2), 210-230. Retrieved from: https://goo.gl/tzFBMD

Chopin, S. F. (2002). Undergraduate research experiences: The translation of science education from reading to doing. *The Anatomical Record*, *269*(1), 3-10. https://doi.org/10.1002/ar.10058

Fallahi, C. R., Wood, R. M., Austad, C. S., & Fallahi, H. (2006). A program for improving undergraduate psychology students' basic writing skills. *Teaching of Psychology*, *33*(3), 171-175. doi: https://doi.org/10.1207/s15328023top3303_3

Hall, P. (2003). Developing research skills in African-American students: A case note. *The Journal of Academic Librarianship*, *29*(3), 182-188. doi: https://doi.org/10.1016/S0099-1333(03)00015-6

Kinkead, J. (2003). Learning through inquiry: An overview of undergraduate research. *New Directions for Teaching and Learning*, *2003*(93), 5-18. https://doi.org/10.1002/tl.85

Linn, M. C., Palmer, E., Baranger, A., Gerard, E., & Stone, E. (2015). Undergraduate research experiences: Impacts and opportunities. *Science*, *347*(6222), 627-634. doi: https://doi.org/10.1126/science.1261757

Lopatto, D. (2007). Undergraduate research experiences support science career decisions and active learning. *CBE-Life Sciences Education*, *6*(4), 297-306. doi: https://doi.org/10.1187/cbe.07-06-0039

Myers, J., Sawyer, A., Dredger, K., Barnes, S., & Wilson, R. (2018). Making Time and Creating Space for Undergraduate Research. *Journal of the Scholarship of Teaching and Learning*, *18*(1), 136-149. doi: https://doi.org/10.14434/josotl.v18i1.22348

Restrepo, B. (2003). Investigación formativa e investigación productiva de conocimiento en la universidad. *Nómadas*, *18*, 195-202. Retrieved from: https://goo.gl/4385Sn

Roncacio, N. M., & Espinosa, H. (2010). Un breve acercamiento a la formación de los semilleros de investigación. Precisiones acerca de algunas diferencias entre la formación investigativa y la investigación formativa. *Revista Logos Ciencia & Tecnología*, *2*(1), 152-157. Retrieved from: https://goo.gl/Uj8L1j

Ruiz, C. (2015). Actitudes hacia la estadística de los alumnos del Grado en Pedagogía, Educación Social y Maestro de Educación Primaria en la UCM. *Educación XX1*, *18*(2), 351-374. doi: https://doi.org/10.5944/educXX1.12158

Secret, M., Ford, J., & Rompf, E. L. (2003). Undergraduate research courses: A closer look reveals complex social work student attitudes. *Journal of Social Work Education*, *39*(3), 411-422. doi: http://dx.doi.org/10.1080/10437797.2003.10779146

Shachter, A. M. (2003). Integrating ethics in science into a summer undergraduate research program. *Journal of Chemical Education*, 80(5), 507. doi: https://doi.org/10.1021/ed080p507

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63-75. doi: https://doi.org/10.3233/EFI-2004-22201

Sternquist, B., Huddleston, P., & Fairhurst, A. (2018). Framing the Undergraduate Research Experience: Discovery Involvement in Retailing Undergraduate Education. *Journal of Marketing Education*, *40*(1), 76-84. doi: https://doi.org/10.1177/0273475317753864

Velandia-Mesa, C., Serrano-Pastor, F. J., & Martínez-Segura, M. J. (2017). La investigación formativa en ambientes ubicuos y virtuales en Educación Superior. *Comunicar*, *25*(51); 9-18. doi: https://doi.org/10.3916/C51-2017-01

Von Arcken, B. C. (2007). Acercamiento a la formación investigativa y a la investigación formativa. *Revista Universidad de La Salle*, *44*, 57-63. Retrieved from: https://goo.gl/kwxPir

Walford, G. (1991). *La otra cara de la investigación educativa*. Madrid: Editorial La Muralla.

RIDU / Revista Digital de Investigación en Docencia Universitaria / e-ISSN: 2223-2516