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New Teaching Methods: Merging "John Dewey" and "William Heard Kilpatrick" Teaching Techniques

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***Abstract*—This article shows our research oriented towards improving doctoral theses by publications. This process is justified by John Dewey's knowledge theory and various phases of Kilpatrick's work. After a theoretical foundation, the research work set the steps in a thesis by publications, which is both validated by members of the scientific community and created from the knowledge of the experience of the candidate in the field of study. Validation of the PhD thesis in this case is found by members of the scientific community in a research validation along publications.**

I. Introduction

THIS article proposes a didactic technique using John Dewey's knowledge theory as the starting point. With experience as key factor, theory and practice have a strong relation and focus education on an experimental and pragmatic approach.

Pragmatism is a school of philosophy originated in the United States in the late 19th century. The term comes from the Greek work praxis, which means action. Pragmatism is not really a philosophical theory but a "mindset" that includes different theories that can be applied to different disciplines. Pragmatism is also regarded as a theory of human beings from the cognitive perspective.

John Dewey's theory of knowledge [1] in conjunction with William Heard Kilpatrick's technique of project-based work produces an improvement of the teaching-learning process.

The combination of both is a different approach to the project-based method from many perspectives: epistemological, psychological, educational purpose, and curriculum development. This article shows how to apply the project-based work to doctoral theses by publications, namely theses composed of a compendium of publications, where there is a project-based work as well as a team that supports the PhD student. By applying a didactical methodology, the study tries to get PhD work and students closer.

A doctoral thesis is usually an original idea from the author. This idea is a consequence of a series of individual and smaller ideas coming from other authors involved in previous scientific researches, with a set of problems to solve.

The development of a thesis then involves the creation of a team aimed at solving a problem using a project-based approach. This team is often comprised of tutor, co-director, supervisor, collaborators and the student. This makes the final results are validated both by the team and the publications, which are a form of validation.

This approach is innovative and unusual, but we think it is necessary to begin the development of scientific research methodologies closer to reality, as teamwork in an interdisciplinary thesis is common. Also, there is a constant exchange of ideas among scientists through published articles, workshops and forums that are a way to provides both corrections as validating the research since its inception.

II. Objective

The aim of this article is to begin research and start a discussion on how to make a thesis by publications around ICTs in education. The starting point is knowledge methods of recognized educators, which are the source of the didactic-scientific methodology nowadays.

The team based the research on its previous three-year period of work on educational curricular organization and classroom methodologies. This experience was vital to develop this research and create a methodology for theses by publications, targeted at the application of theory to the productive, research or corporate sectors, thus creating theses applied to real environments such as industry, education or health.

III. State of the art

John Dewey sees education as the sum of processes by which a community or social group transmits its acquired powers and objectives, to ensure its own existence and its continued growth. He built an entire pedagogical philosophy with experience as a base, defining education as "a reconstruction or reorganization of experience, which gives meaning to experience and increases ability to guide subsequent experiences" [3].

The main element related to Dewey's theory of knowledge is the concept of experience. This concept is also the most important of his theory. Dewey proposes defines experience as a dynamic concept, an exchange between humans and

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their physical and social environments, not simply a matter of knowledge. Moreover, experience entails a series of actions and affections, and cannot therefore be as a simply subjective term. Dewey states the experience is based on connections and continuities, implying processes of reflection and inference and linking experience and thinking [4].

Summarizing Dewey's proposal, the key element of knowledge and also the most important is a progressive education. The general method is an aim-driven action that takes into account activities such as artistic activities, past, tradition, and techniques that development that activity. The management of the scientific method must be guided by scientific knowledge. Because of this, Dewey believes educative methods must derive from the scientific method, adding any necessary adaptations. This is the so-called "Dewey method" or "problem method", a sequential process used to outline learning as a research activity. With this method, learning becomes a chapter in the general research method [5], comprised of five stages [6]:

- The student has a situation of authentic experience. In other words, there is a continuous activity in which the student is interested.
- A real problem arises in this situation as a stimulus for thought.
- The student posses the information and performs necessary observations to tackle the problem.
- Suggested solutions make the student realize she is responsible for developing them in an organized way.
- The student has the opportunity and the chance to test his ideas for their application, to clarify its meaning and to discover their validity.

Alternatively, Kilpatrick created the following method that "arises from a proposal made for the purpose of teaching the Dewey's concept of thought. This method became a more concrete way of acting in the field of practice than in theory [7]:

- First stage: students choose a topic from a set proposed by the teacher.
- Second stage: once students reveal their interest, we must assess their prior knowledge about the topic. This phase is called "What Do We Know?"
- Third stage: the following question is asked: "What do we want to know?" The answer is objectives and contents the students should acquire through analysis and research on the chosen topic.
- Fourth stage: "How can we know it?" phase or "investigate and learn." Here we must take into account the elements of the methodology (organization of space and time, materials and resources to use, people who will help us, sources of information and activities).

• Fifth stage: "What Have We Learned?". This stage corresponds to the evaluation. Students tell about what they liked most, the least, specially difficult tasks... and will reflect our work in a final document to provide greater value to our work (reports, letters, drama, book project) that will be stored in the classroom library.

The project-based method leads to a significant and globalizer learning process where students assume more responsibility for the own learning and use acquired skills and knowledge in real problems. We therefore need to take into account the theory of significant knowledge by David Ausubel [8], which states that significant knowledge occurs when new information "connects" with relevant concept a ("subsunsor") that already existed in the cognitive structure. Thus, new ideas, concepts or relevant propositions can be meaningfully learnt, as others are clear and available in the cognitive structure of the individual, working as an anchor.

Once we have justified the cognitive perspective of project-based work, with Dewey's theories of knowledge and Kilpatrick's project-based work, we need to evaluate the research methodology in order to adapt it to research on the use of ICTs in classroom education.

IV. Thesis Methodology: Summary of Publications

At the point of state of the art we have developed the necessary starting points for this item, we will develop as they could be the steps for developing a thesis by publications, adapting the method steps for projects Kilpatrick, is a methodology for creating and decorating that could be adapted to their needs, we must also note that we have to take into account the meaning of a thesis by publications where doctoral dissertation develop through the articles achievement of previously set objectives.

The figure presented below find the different phases of the period of creation of the thesis, there are five stages in white, these phases are designed to obtain the different phases that are the definition, validation of ideas, the specific development, application of the results and final phase of integration and evaluation of results. The blue line found the feedback from the doctoral thesis of companies, researchers conducting a review of exports and the items made. These sections in conjunction form a series of phases, as described below.

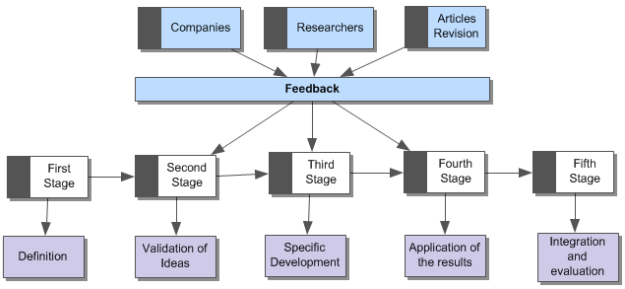

Fig. 1 Stages

A. First stage

In this first phase the doctoral student must select the subject of the thesis, this process must be from the starting point of the knowledge of the candidate, director of the thesis proposes possible research. In this first phase of the doctoral student must submit inquiries to define their own line of research. This period is a period of reflection, which must be accompanied by a practical part, this practical part must include a period of experimentation must also include scientific methodologies a practical part that is as close as possi-

ble to the productive sector which will intended research. This PhD received feedback both the method and the specialized staff working in these sectors may thus incorporate new elements of judgment and experience by providing both solutions and establish the objectives, hypothesis and problems.

We are therefore faced with the definition of the research of the thesis as we see include the problems that you are encountering in the productive sectors, this is a way of bringing doctoral reality and allow the implementation of doctoral thesis the productive sectors of the industry, thus bringing research computer schools, both companies like the different sectors, since the computer is a highly interdisciplinary and cross science, in which the approach to the problems from companies improve the concept of applied computer science.

The starting point for the hypothesis may be that hypotheses are possible solutions to the problem are expressed as generalizations or propositions. These are statements that consist of elements expressed as an ordered system of relationships, which are intended to describe or explain conditions or events not yet confirmed by the facts. [9].

The PhD student may pose for a series of scientific articles that should culminate in the precise definition of objectives that will develop and what the scope of the investigation.

In this first part of the doctoral student should perform a series of articles in order to ensure the research and thus allow other members of the scientific community to review the established line, this series should end with the completion of A final item that we could call "Phd Thesis Objectives Article" which clearly embodying the following points:

- Problem
- Hypothesis.
- Objectives.
- Scope of the problem
- Development methodology of the thesis

It is therefore a series of articles that trigger at the origin of the research and the idea of the author is protected from the start by posting the same and its transmission to the members of the scientific community in the concrete explanation that general solutions can be a bear to achieve the objectives.

B. Second stage

In the previous phase have described that we do, through a process of validating ideas and methodology publications, in this second phase begins developing the doctoral thesis, verifying and enhancing their knowledge, this knowledge is not science specific on which the PhD is done, but the novelty here ye must learn and see what knowledge and must be purchased on the implementation of the thesis, dissertation that apply to a specific production sector.

In this case depending on the possibilities the director of the thesis, shall perform a work accompanying the doctoral candidate in the search for work experience in a company of the productive sector, as in the formation of this in the field, thus we get that you obtain a better view doctoral researcher field applied to the reality of the productive sector, in turn the doctoral student must complete the items necessary for the realization that solutions can be, how it will be if your metodolgoia7y seen an increase and modification of the objectives, hypotheses and the emergence of new problems.

This phase must be completed with the creation of an article in which the objectives will be translated and how they will achieve these goals, technologies and designs all the justification necessary in order to introduce the members of the scientific community and its progress if need help from a researcher in validating their results or have an investigator which states something. This is the turning point where the work really begins, once the revision of the article from which the solution begins with the objectives.

C. Third stage

Once validated and completed the objectives, problem and methodology doctoral students proceed from scientific publications a specific development for each of the objectives, i.e. scientific publications will be aimed at the solution of each of its objectives separately, where maintaining a classical structure of the article, abstract, introduction, aim of the thesis being treated, points of development and verification of the aim of the thesis.

During the review process these items reviewers may seek clarification on these items or possible improvements for sharing the results thereof, such information shall be forwarded to the director of the thesis in order to recapitulate the development data items if necessary a greater realization of the objectives or a breakdown thereof, the doctoral student must retake these changes and make publications in order to clarify and modify the changes that reviewers indicate.

D. Fourth stage

At this stage we continue the exploration of the research, it is time to validate the objectives and whether the solution is true, for it would have to perform the doctoral an article of inclusiveness, we might call integrator article dissertation, this article must integrate items developed in previous phases, this is where the doctoral student researchers and will see the entire investigation.

This point is important because the overall view can offer both weaknesses and strengths in the investigation thereof, is another as another feedback point of the thesis. This can be done by hand, a redefinition of the objectives or the appearance of new targets to be treated as a whole, at this stage the direct application of the results obtained in a case of direct application is also included.

There are multiple options for an application of the results obtained, we believe that such validation items that have been made, it would be interesting for the creation of articles, presentation application sectors of the thesis, we thus validate Objectives from the IT point of view but from the point of view of the application of research. This is an analysis of the results expose these results to anyone who will use and proceed to the validation of these from the point of view of the application.

E. Fifth stage

The evaluation process, feared by all doctoral candidates, one way to do this is to make a final scientific article in which the doctoral drafted the level of achievement of the objectives and the solution of the problem has been achieved, this can be done many forms depending on the subject of the thesis, a way is made an article with realizer integrative conclusions based on the main items of a solution to the whole problem, in this paper besides an integration under one thread should capture the level of achievement of the objectives through the articles, a section that can clarify this situation is the main product, a case study in which the solution to be integrated, this has been developed in different scientific papers but is a way to facilitate an understanding of their research as a whole.

The combination of the phases can be performed the same research methodology, we highlight one hand the organization of the work we have previously pointed out the phases and other research methodology, this methodology must also develop in the realization of the articles, the reason for this is that the development of the items directly affects a good realization of the final conclusions and also have to have external factors as shown previously described. In the figure below we present such as the research methodology within each of the phases.

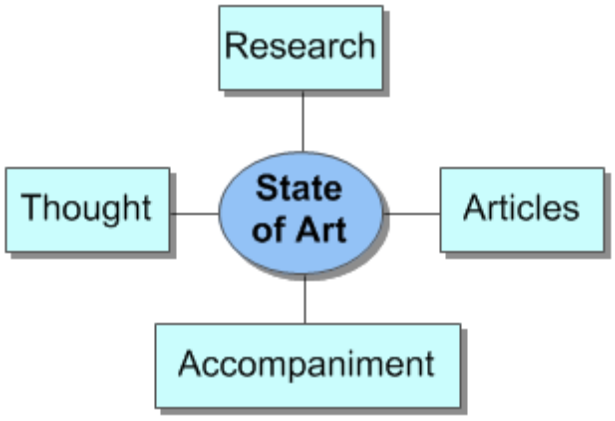

Fig. 2 Research methodology

From the state of the art, a research by the scientific articles that tries to find solutions to the objectives and problems encountered in the translation of the thesis is done, the presentation of scientific papers in international journals and conference allows the option to review other researchers, we put in the focus state of the art, this state of the art is not that we are used to now, is to make a state of the art in two parts, first we make a study of what the needs or as the productive sector which is destined. It is also important accompaniment of the thesis supervisor and the doctoral student in situations where you will apply the final result of the thesis in order to produce feedback to the thesis.

Once the sections of the thesis done we can think of the following index for the thesis, as these consisted of a doctoral thesis by publications is necessary to capture very specific things, and a good way to see it is through an index, which it can be shown below:

1) Problem Hypothesis and Objectives.
2) Scope of the problem.
3) Theoretical Framework: State of the art where
4) Need.
5) Articles published, plus should consist of the full text article for a description of the stage at which it is and has been achieved with this article.
6) Conclusions inclusive, this point should in addition to the final conclusions of the thesis describe, ideally write a case study integrating papers made in order to see an overall solution to the problem described in another section and the level of achieving the objectives through the items.
7) Future work.

V. Centralized research resumé

Once we have described the methodology and the different phases, in previous research we have described as the centralization of student resume is performed [10] [11]. In this section, we plated the goals of our future research in order to extract information from the presentation of this publication will be a starting point for a series of articles in which we set the following objectives.

Centralize the doctoral curriculum, depending on the work done during the development of the doctoral thesis, in which it is to storing all the work done, this main objective we can be subdivided into:

- Classification of the knowledge of the candidate technologies starting with handles and transverse fields has been working.
- Targets developed on each of the items, giving a score by the reviewers as to the level of achievement of the objectives in the articles.
- Search for researchers under a similar profile, in order to enable collaborative research work with similar objectives, although these are in a different line of research
- Communicate with companies achieved the objectives in research; this would open the way to the outside research in the investigation periods.
- Curriculum vitae researcher from the milestones it has been marking the researcher, making unique and validated cataloging items.
- Integration of the resumes of researchers in a body that also lend credibility to this research allow feedback, this organism can be for example the top universities, can use this feedback to generate other lines of research.
- Recognize the idea of the researcher in scientific forums, in order to ensure that the PhD was who came up with the idea and avoid potential problems in the development of research that can last five years.

These objectives are the beginning of a new line of research and here with comments from reviewers and members of this conference can be a start to know the real possibility of whether a line of research is possible or necessary.

VI. CASE OF STUDY

In this section we will make the assessment objectives which would be a summary of the findings and integrating validation of submitted articles for my doctoral thesis, the starting point was 4 years ago when the computer was working doctoral technician for School 2.0 program [12] in Spain, the field of application of the thesis is the use of ICT in classroom education, so we set from the beginning to facilitate the tasks of the teacher through a system that allows the creation, maintenance curricular programming for the educational stages of Primary, Secondary and Vocational Education, from:

1. Creating curricular schedules that allow teachers to structure their programming following the official curriculum, divided into teaching units have a distribution in sessions over time, justification, objectives, core competencies, provide content, materials needed, activities, qualification students, attention to diversity for students with special needs, methodology.
2. Structuring and preparing the working sessions within their curricular programming, taking into account the learning unit wherein said working session is located.
3. Track the teaching-learning process of their students in collaboration with parents, attending the assessment, rating and monitoring of the student in this process, which will also improve mentoring.
4. Ensure a flexible system that allows the inclusion of activities and creating them from existing educational platforms, including such activities in the lesson plans the teacher develops within its programming.
5. Centralize the educational curriculum vitae student, taking into account the results and the level of achievement of the objectives in addition to basic skills attained.
6. Improve the interaction between students in the classroom by Distributed Graph User Interfaces (DUI), thus improving the teaching methodology in the classroom.

These objectives we have worked throughout the research time and have been monitoring the level of achievement of the objectives through the items, as you can see in the summary of the conclusions, which we integrate below:

First we defined the cloud services necessary for the development of curricular schedules of teachers, including the creation of curriculum schedules following the official curriculum and following a structured work sessions where the teacher indicates the activities to resolve considering objectives, core competencies and the specific needs of each student [25].

Once you have developed these services is necessary to establish the curricular structure of the official curriculum and curricular programming that allows storage managers of database systems with the information associated with each of these [14] [15].

One of the most important aspects is to track student evaluation. In this respect we track the teaching-learning process based on objective and core competencies of the contents worked by students in activities and assessment tests have been conducted, establish a system to score each of the activities taking into account basic objectives and the teacher determined the creation of each one of the activities that make up the didactic units that form the annual teacher curricular programming skills. The inclusion of activities in curricular programming allows teachers to better development of their daily work and provides flexibility that is possible thanks to the integration capacity of the systems in the cloud and the ability to leverage interoperability of Web services [16] [20] [21] [23] [24].

On the other hand improving student resume and centralization is possible because the system on which the assessment is made is a score of basic skills that students obtained in academic courses [10] [11].

The teaching methodology is achieved by improving the interaction, by using the graphic user interfaces distributed (DUI, Distributed User Interfaces) and insertion patterns of education as a service in the cloud, allowing the inclusion of teaching methodologies in programming and that the teacher can adapt these methodologies to the student group [19] [22] [24].

In the research process is important also apply learning, which is why publications have made a different line of research to validate what we are doing and allow us to continue our research in the future to other lines of research [17] [18].

VII. CONCLUSIONS AND FUTURE WORK

The development of doctoral theses by workers compendium also includes collaborative work we must also give a definition and approach to achieve specific objectives, these objectives must abide by and comply to reach a good end development, these goals are dismembered objectives pertaining for each item in order to perform a better specification of problems to solve. Surely many of these objectives will be converged with other researchers so flexibility is important and here comes the opening teamwork among researchers, so it will be important to re plan, refocus and rediscuss the scope and needs from know the real development of the doctoral thesis.

The Director of the thesis is a fundamental task as it must ensure the best options for the doctorate and the completion of the thesis in a while possible, this teamwork between different doctoral can make different lines appear very close research so the director of the thesis may take this opportunity to look for new and continuing doctoral research.

The type of evaluation process is enclosed in a unstructured learning environments, with specific objectives but flexible and open, conducted by a research activity that encourages told and team learning environments between different doctoral research and also took the research experience to the production system in real contexts, experiential learning theory of John Dewey suggests in his theory of knowledge.

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