

MIGRATION OF PRESENTIAL TEACHING FOR DISTANCE EDUCATION: QUALITATIVE STUDY OF COGNITIVE RETENTION IN THE FLIGHT INSTRUCTORS PREPARATION COURSE

Paulo Roberto Cursino dos Santos*

Leticia Veiga Vasques**

Pedro dos Santos Portugal Júnior***

* Bachelor of Aeronautical Sciences from the Academia da Força Aérea (AFA) and Specialist in Public Management from the Universidade Federal Fluminense (UFF). MBA in Strategic Planning and Management from Grupo Unis and Escola de Comando e Estado-Maior da Aeronáutica (ECEMAR). Brasília, Distrito Federal, Brazil. E-mail: cursinoprs@hotmail.com

** Master of Arts at Universidade Vale do Rio Verde (Unincor). Specialist in Business Communication and Marketing by Grupo Unis. Varginha, Minas Gerais, Brazil. E-mail: leticivasques@unis.edu.br

*** Post-doctorate, doctor and master in Economic Development by the Institute of Economics of the Universidade Estadual de Campinas (Unicamp). Specialist in Business Management and Bachelor of Economics from Faculdade Cenecista de Varginha (Faceca). Professor and researcher at the Unis Graduate Program in Management and Regional Development. Elói Mendes, Minas Gerais, Brazil. Email: pedro.junior@unis.edu.br

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Abstract

The work analyzes the migration from face-to-face education to distance learning among students of the Flight Instructors Preparation Course, taught by the Tactical and Specialized Instruction Group. The qualitative approach to retaining knowledge is necessary because of the modernization of the Aeronautics Teaching System. The objective was achieved through bibliographic review and comparative study between editions of the same course, for which identical evaluations were applied. The analysis corroborates the hypothesis of qualitative gain in the cognitive retention of students who took the course in distance mode.

Keywords: Teaching method. Distance education. Brazilian Air Force. Instruction Group.

1. Introduction

The current study comes from the attempt to analyze, qualitatively, the migration process from classroom to virtual education within the Group of Tactical and Specialized Instruction (GITE), regarding the Flight Instructor Preparation Course (CPIV), based on the factual analysis of the results obtained and compared between presential and non-presential groups in the years 2015 and 2016.

From the qualitative point of view of the retention of knowledge by CPIV students, taught at GITE, the concern was based on the doubt if CPIV semi-presence wouldn't train students with qualitative loss in relation to the same course in person. In this scope, it is hypothesized that the multidimensional approach (GARDNER, 1999) of the virtual learning environment would facilitate the active construction of knowledge by the students,

providing greater cognitive retention when compared to the one-dimensional approach of face-to-face teaching for the same course.

In the scenario described, the present theme is of great personal relevance to the researchers involved, since these practices and concepts inhabit their cognitive universe. Timely, with regard to the social approach of this research, it is envisaged that the reflections developed contribute to the work of operational knowledge management developed by the Air Force Command (COMAER).

The central objective of this study is to carry out a qualitative analysis, in the light of modern education, of the cognitive retention between two different modalities (presential and semi-presential) when used by CPIV, in the spectrum of operational skills of the Preparation Command (COMPREP). In this way, it aims to develop critical reflections on the management of the most important intangible asset – intellectual capital – and, further, to promote studies related to the expansion of the offer of non-classroom courses within the scope of COMPREP and, possibly, of the Brazilian Air Force (FAB).

In order to achieve the objectives proposed here, a factual analysis of the results obtained and compared, between presential classes and non-presential, was carried out in the years 2015 and 2016. Thus, the research will intend, through bibliographic material and data collection for evaluation and course control (SCRIVEN, 1966), to analyze the pedagogical aspects that permeate the theme, considering that the focal point is, primarily, the modernization of the Aeronautics Education System (SISTENS), according to the FAB documentation in force.

2. Distance learning and the virtualization or modernization of the school

With the growth of Distance Education (EAD), since its beginnings in the 18th century (ALVES; ZAMBALDE; FIGUEIREDO, 2004), society has undergone different sociocultural reactions to breaking paradigms about presential teaching. There were sequences of advances and setbacks since the mail, which was the initial form of offering courses in this modality. Anyway, since the beginning, the purpose of EAD was to expand the offer of educational opportunities, allowing the less privileged social strata to participate in the formal education system, especially in basic education, since the initial EAD concerns were focused at this level of education and in preparatory courses for work (MUGNOL, 2009).

At the philosophical core of the new way of studying, the student was considered to be the center of attention, an active and constructive being of the teaching and learning process (VYGOTSKY, 1991), notably, a view as much as countercultural under the social perspective of the mythification of the teacher as the powerful holder of knowledge.

In this theme, the distance educational process was and is recognized as student-centered and mediated by information society technologies, a fact that leads to the need to investigate how students and teachers, with the use of these new technologies, can collaborate to generate or build new knowledge (MUGNOL, 2009).

The military student has a different profile, which suggests self-discipline, motivation, responsible autonomy and self-empowerment

In the era of hyperconnectivity, the constant evolution of computing and communication means outlines new relationships between the actors in the teaching-learning process. Education becomes, more and more, a communicational process, in which one seeks to overcome the classic model, which was dichotomous between sender and receiver. In the new model, the teacher has the responsibility of leading and guiding the teaching process, which constitutes a dialogical and pluralistic relationship, which provides equal opportunities for students, understood as those responsible for learning. In this way, communication at school involves a participative pedagogical action, according to which teachers and students, being on the move, expand their knowledge, interactions and forms of communication, with technologies that provide learning (PORTO, 2006).

Adopting the student as the focal point of this process, the restructuring of SISTENS, regulated by Law no. 12,464/12, supported by the document entitled Plan for the Modernization of the Aeronautical Teaching System (PCA 37-11/2017), led GITE to seek experienced instructors and teachers, with adequate training, trained and updated to meet the pedagogical objectives, respecting each student as a unique individual, stimulating their skills and competences so that, in addition to learning, they can become capable, efficient and proactive military and civilians.

Cirigliano (1983) states that Distance Education is the midpoint of a line at whose ends is the presential teacher-student relationship, on the one hand, and, on the other, open self-taught teaching, in which the student acts without help or dialogue with the teacher. In a future perspective, it is a challenge to bring to the Brazilian reality the concept of modernization of teaching for the XXII century¹ (JARAUTA; IMBERNÓN, 2012), with characteristics similar to those of counterculture, given the difficulty of self-training, conscious discipline maintenance, and incorporation of collective sense by the population of Brazil. Brazilian culture, charged with subjectivity and emotion (KOURY; BARBOSA, 2015), imposes obstacles to the implementation of autonomous models of knowledge construction (TEDESCO, 2003). From this perspective, the assumption of qualitative losses in the process of building skills and knowledge by the students of distance courses would be consistent.

However, the military student has a different profile, which suggests self-discipline, motivation, responsible autonomy and self-empowerment, characteristics amalgamated by the Training and Strengthening of Values Program (PFFV), provided for in the MCA 909-1 Air Force Command Manual, and in a constant application in Military and Teaching Organizations at FAB. This fact, counterculturally, diverges

from the subjectivity and emotion described by Koury (2015), and does not generate barriers to the effective implementation of autonomous models of knowledge construction.

Thus, the search for modern teaching at GITE justifies the proposal of this work, reinforcing the advantages of innovating in teaching practices and techniques that provide the student with qualitative improvements in the construction of knowledge through active means (VYGOTSKY, 1991). In addition, the professional relevance of this theme is reflected in the vision of intangible intellectual capital, a preponderant object in the basic studies for the SISTENS Modernization Plan (PCA 37-11 / 2017).

In this way, the FAB Operational School evolved, within the constructivist views of Vygotsky and Piaget. Thus, the decade of 2010 has historically marked Air Force operational teaching, as it values the student even more as the focal point of the teaching-learning process and for building operational knowledge in the sky fighter. At this point, GITE was a fundamental piece for SISTENS, serving as a transitional tool from the classical school to the school of the 22nd century.

At this point, it is interesting to subdivide this article into two topics: the transitional tool and the changing course, to better understand the aspects involved in the theme. CPIV was the substrate chosen for this purpose, given the vast experience of the FAB Operational School in this area of aeronautical teaching. The effective transformation of the course and its managerial developments will be addressed in the subsequent topic, with due data and their respective analyses.

3. CPIV as a transitional tool

From the perspective of operational knowledge management, CPIV is one of the most relevant operational courses for COMPREP. It is the course that prepares the airborne teacher, which transcends modern pedagogy and takes it to the real 3D classroom, without virtualism or augmented realities, which takes it to the air, to the sky. At this point, the aircraft is no longer a mere means of transport or an armed vector and becomes a classroom with unique characteristics.

This course, with three decades of application, included in the Aeronautical Course Table (TCA 37-4/2018), has its Minimum Curriculum (MC) approved and published by the Instruction of the Aeronautical Command (ICA 37-503/2014) and other teaching documents, following the provisions of the National Education Guidelines and Framework Law (LDB) – Law no. 9,396/96.

Over time, the course has been improved, didactically and pedagogically, to meet the constant evolution of teaching, of technologies applied to teach, of the requirements of the FAB and of aerial means. In addition, it has also evolved in terms of presential², semi-presential and, as of 2018, completely non-presential course.

As mentioned earlier in this paper, there were systemic doubts as to whether the distance course would train students with qualitative loss in relation to the same

course in person. In this regard, CPIV was used as a transitional analysis tool to verify the qualitative feasibility of converting dozens of other face-to-face operational courses into distance education.

Thus, the hypothesis arose that the multidimensional approach of the virtual learning environment would facilitate the active construction of knowledge by the students, providing greater cognitive retention when compared to the one-dimensional approach of classroom teaching for the same course. The hypothesis that will be analyzed in the evolution of the course in transformation, qualitatively, through bibliographic review and comparative study.

4. Course in transformation

The CPIV Evaluation Plan, approved and published in ICA 37-503/2014, defines, in line with the guidelines and bases of national education, the evaluation criteria, whether formative, summative, or diverse, within the revised taxonomy of Benjamin Bloom (SIMPSON, 1972), in the affective, cognitive and psychomotor domains, for the effective construction of the necessary skills (HATCHER, 2013) to the good flight teacher or, in the aeronautical context, to the good flight instructor.

The course, complying with TCA 37-4, was made available in the period under analysis on presential and non-presential modalities, with three annual editions, under the full responsibility of GITE. Within the pedagogical pluralism outlined by Law no. 12,464/12 and the school's pedagogical autonomy, text inserted in Law no. 9394/96, GITE drew up its Pedagogical Proposal, in order to promote the concrete construction of competencies that meet the interests of COMPREP, concerning the preparation of its human material (ZOOK, 2006). CPIV then becomes the 'trial balloon' for the application of new technological resources, previously not implemented in GITE, and new teaching techniques and methodologies to maximize learning processes.

A fact that draws attention is the absence of summative assessments in both types of CPIV, a situation provided for in the course's Evaluation Plan. Added to this is the pseudo-randomness of diagnostic evaluation (performed unexpectedly), not informed to students and applied in several editions of the course. This fact, in principle, would not motivate greater dedication and study by the students, since it would not influence the successful completion of the course.

In this context, summative assessment is, in essence, retrospective, as it is interested in synthesizing what the student has learned, what he knows or does not know and what he can accomplish in the final stage of a cycle of the teaching-learning process (SADLER, 1989).

As highlighted in the introduction, we intend to analyze, qualitatively, the migration process of teaching modality, within GITE, concerning CPIV, taking place from the factual analysis of the results obtained and compared between presential and non-presential classes in the years 2015 and 2016, through the application of

identical assessments, both in presential and distance education, maintaining equal conditions among students.

From the information collected, from January 2015 to November 2016, regarding the three annual editions of the same course, in different modalities, the following data were extracted:

Table 1 - Diagnostic assessments applied in the CPIV editions for the 2015-2016 biennium

EDITION	PRESENTIAL	DISTANCE EDUCATION
2015-1 Presential	accomplished	not applicable
2015-2 DL	not applicable	not accomplished
2015-3 DL	not applicable	not accomplished
2016-1 Presential	accomplished	not applicable
2016-2 DL	not applicable	accomplished
2016-3 DL	not applicable	accomplished

Source: Adapted from Grupo de Instrução Tática e Especializada (2016).

The averages of samples taken from any distribution tend to show normal behavior as the number of observations increases

It can be seen in Table 1 that the course, in the 2015-2016 biennium, was taught in two presential and four distance editions. It also appears that the pseudo-randomness generated four samples, two related to presential teaching and the other half corresponding to distance learning.

Another aspect worthy of analysis is that the classes of students were composed, in all editions, by heterogeneous groups of 40 individuals, aged between 25 and 39 years old, from the universe of military pilots of the FAB, from Fighter Aviation, Transport, Maritime Patrol, Aerial Reconnaissance and Rotative Wings (Helicopters). This fact typifies the normal distribution of diagnostic evaluation scores on a Gauss curve for more than 95% of the collective phenomena existing in nature.

The importance of this distribution lies mainly in the fact that many natural phenomena have a normal or approximately normal distribution. In addition, the averages of samples taken from any distribution tend to show normal behavior as the number of observations increases (BITTENCOURT; VIALI, 2006).

In this prelude, highlights the curricula, the program's content and the evaluation plans of both modalities (presential and distance learning), which are the same. It is still worth mentioning, in the meantime, that there was equality of conditions among all students to carry out the diagnostic test in person, either for the distance learning or the face-to-face student. The tests were carried out through the application of identical assessments and with a regular distribution of the difficulty indexes of the questions, in the percentages 25/50/25 (low/medium/high difficulty). The data obtained in the presential editions of CPIV were compiled and tabulated in Table 2.

Table 2 - Simple arithmetic means, of the diagnostic evaluations of the CPIV in person, related to the 2015-2016 biennium

EDITION	AVERAGE
2015-1 Presential	8,583
2016-1 Presential	8,349
PRESENTIAL GENERAL AVERAGE	8,466

Source: Adapted from Grupo de Instrução Tática e Especializada (2016).

In view of the data presented in Table 2, a small dispersion or less variability is perceived between the grades of the 2015 and 2016 presential classes, corroborating the normal distribution in a Gaussian curve, and even above the cutoff point for successful completion with the yield of course estimated at 7,000 (seven) points, according to ICA 37-503.

Thus, with low degree variability in the editions under consideration, the Gaussian curves overlapping for the 2015-1 and 2016-1 editions are seen, within the expected normal distribution, which points to a stable and controlled process.

Nevertheless, the same table extracts an overall average of 8.466 points between the presential classes of 2015 and 2016. The table below shows the tabulation of the degrees related to the non-presential student, obtained in diagnostic evaluation, presential and unexpected, similarly to the evaluation process applied to presential students.

Table 3 - Simple arithmetic averages, of the CPIV DL diagnostic assessments, for the 2015-2016 biennium

EDITION	AVERAGE
2016-2 DL	9,483
2016-3 DL	9,791
GENERAL AVERAGE DL	9,637

Source: Adapted from Grupo de Instrução Tática e Especializada (2016).

After observing the data tabulated in Chart 3, it is noticed, analogously to Chart 2, the low dispersion or variability of the degrees obtained by student groups, meeting the concept of normal or Gaussian distribution (BITTENCOURT; VIALI, 2006).

Thus, taking into account the maintenance of the pseudo-randomness of the evaluation process, it appears that the non-presential student obtained a grade in the simple arithmetic mean equal to 9,637 points, within the Central Theory of Limit³ (MOIVRE, 1756), higher than the presential student.

The distance learning CPIV is superior in quality to the face-to-face course

Such result corroborates the hypothesis that the multidimensional approach of the virtual learning environment would facilitate the active knowledge construction (PIAGET, 1986) by the students, providing greater cognitive retention when compared to the one-dimensional approach of face-to-face teaching and, even in an inverse way, refutes the concern that the Semi-Presential Preparation Course for Instructors of Flight would train the student with qualitative loss in relation to the same course in-person mode.

Thus, it is perceived, in the first analysis, that the multidimensionality of the virtual learning environment works in multiple areas of the cognitive, affective and psychomotor domains (SIMPSON, 1972), within Howard Gardner's concepts and Theory of Multiple Intelligences.

From a qualitative-quantitative perspective, it is noteworthy that the performance compared between the samples of presential and non-presential editions suggests that the distance learning CPIV is superior in quality to the face-to-face course, effectively demonstrating a quantitative result 13.83% above the average obtained by the classic or face-to-face modality, from the same evaluation instrument, with identical questions for all tests applied to the students. That said, it remains now to turn to the technical-conclusive focus of the present work.

5. Final considerations

At this moment, in view of the analysis of the data collected from January 2015 to November 2016, referring to the three annual editions of the same course in different modalities, in what concerns the doubt that the distance course would train the student at a loss qualitative in relation to the presential course, it is possible to contest with the hypothesis that the multidimensional approach of the virtual learning environment would facilitate the active knowledge construction by the students, providing greater cognitive retention when compared to the one-dimensional approach of presential teaching for the same course.

Thus, it was observed that the absence of summative assessment did not suggest, interfere, nor motivate additional study load for the conclusion of the course, corroborating the view that students did not prepare or did not study to complete an assessment instrument.

Still in this line of reasoning, it can be said that the 13.83% higher performance in the result of formative/diagnostic assessments is related to the dialogue of this new modality and its methodologies with the student, corroborating the positive aspects of the multidimensional approach in active knowledge construction and generally providing greater cognitive performance in the teaching-learning process.

In this approach, the hypothesis that the multidimensional approach to the virtual learning environment facilitates the active construction of knowledge by students, effectively providing greater cognitive retention compared to the one-dimensional approach to classroom teaching, is corroborated.

Notwithstanding, this work demands greater depth in the qualitative and quantitative analyzes related to the processes of conversion of presential courses into distance learning conducted by GITE in the 2018/2019 biennium, as a way of improving the operational teaching process and maximizing the operational capacity of the Air Force means, to fulfill the mission of controlling, defending and integrating the 22 million square kilometers, under the responsibility of a sovereign nation, in the era of hyperconnectivity.

It is emphasized, as a major limitation of this study, the approach of a sample of data restricted to only two years, since these are the information available until the moment of the present research.

Notes

¹ The concept of the 22nd Century School seeks reflections on the need for greater professionalism to the teacher, insofar as it makes him socially responsible for the student's results and reflects, philosophically, on teaching centered on technology with morals and values, solidified by scientific bases and moral control.

² At school or traveling. In the latter case, according to the concept of On the Job Training (OJT), which derives from Albert Bandura's observational learning studies (BANDURA, 2007).

³ In the Central Theory of Limit, formulated by Abraham de Moivre, in the 18th century, the increase in samples approaches a normal or Gaussian distribution.

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