

QUALITY ASSURANCE AS A DRIVER FOR OPERATIONAL READINESS IN MILITARY HIGHER EDUCATION

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Abstract

This article argues that quality assurance (QA) in military higher education cannot be reduced to a bureaucratic compliance exercise but must be understood as a strategic lever for operational readiness. Drawing on a single-case mixed-methods study ~~of from~~ the Portuguese Naval Academy, we link internal quality dynamics to the future capability requirements identified in the Navy's long-term strategic planning. Quantitative data from a census survey of 170 cadets (~~n = 170~~) and a near-census of academic staff (~~n = 22~~) reveal critical vulnerabilities: only 13% of lecturers are perceived as "excellent" and 24% of cadets state they would not reapply to the institution. These findings are triangulated with documentary analysis and ~~elite subject matter expert~~ interviews with the Academy's Commander, the national quality assurance agency (A3ES), and the joint military higher education authority, in order to assess their implications for the emerging profile of officers required to operate technologically complex platforms with reduced crews. Building on this diagnosis, we propose a new Integrated Quality Assurance System (SIGQ) structured in macro-processes (integrative, core and support) and epistemically anchored in the field of Naval ~~Military~~ Sciences. We contend that, in this context, QA systems can function as early-warning mechanisms ~~for to~~ ~~assess risks in~~ talent retention ~~risks~~, scientific ~~capacity-capability~~ and interoperability, thereby linking quality work directly to defence effectiveness. While based on a single national case, the model offers a transferable framework for other European military academies navigating the Bologna architecture under conditions of strategic uncertainty.

Keywords: Higher education, ~~quality~~ assurance, operational readiness, naval ~~military~~ sciences, accreditation.

1 INTRODUCTION

In the contemporary global landscape of Higher Education, the concept of 'Quality' ~~– fit for purpose –~~ has transitioned from a peripheral administrative concern to a fundamental pillar of institutional strategy and survival [1]. Within the specific and demanding domain of Military Higher Education (MHE), this evolution presents a multi-faceted challenge. MHE institutions are uniquely tasked with a dual mission: they must provide a robust academic education that adheres to the European Higher Education Area (EHEA) standards – formulated through the Bologna Process – while simultaneously ensuring the professional, moral, and physical preparation of future officers for the rigorous demands of national defence and maritime security [2].

The Portuguese Naval Academy (*Escola Naval*), as a centenary public university-level military institution, has historically ~~demonstrated showed~~ a significant capacity to adapt to successive legal and structural reforms imposed by both the Portuguese State and the international community. However, as the 21st century progresses, the Academy finds itself at a critical juncture. In an era characterised by "strategic uncertainty" and the rapid emergence of disruptive technologies, traditional quality management frameworks – often imported directly from civilian academic models – frequently fall short of addressing the specificities of the naval profession.

A prevailing issue identified in recent literature and institutional practice is the perception of Quality Assurance (QA). Frequently, QA is viewed by both academic and military staff as a ritualistic, bureaucratic exercise in compliance rather than a dynamic lever for genuine organisational improvement [1]. This "compliance trap" often leads to a disconnect between administrative metrics, which may appear satisfactory on paper, and the actual "Operational Readiness" required by the Navy's long-term strategic planning, as articulated in the *Diretiva Estratégica da Marinha 2022 (DEM)* [3]. The DEM explicitly calls for a "holistic, ready, and technologically advanced Navy," a vision that is unattainable without an educational system capable of fostering innovation and excellence in its human component.

The current study is driven by the identified need to reform the Naval Academy's existing Quality Assurance System (SGQEN). Evidence suggests that the current model, despite undergoing various revisions over the last decade, yields results that are often intangible and fail to provide actionable data for the Navy's top management. Critical vulnerabilities have been noted, particularly regarding the pedagogical competence of military staff and the slow pace of curricular modernisation in response to emerging naval technologies (Strategic Initiatives IE13 and IE16). Furthermore, the lack of a student-centred approach risks compromising the motivation and retention of talent within the institution, a concern already identified in preliminary assessments of the system's focus [4].

This paper argues that an effective QA system in a military context must function as a strategic early-warning mechanism. By monitoring institutional "health" through a student-centred lens – utilising learning outcomes as a strategic link [5] – the Academy can identify latent risks in scientific capacity and interoperability before they manifest as operational failures at sea or any operational theatre. To address these challenges, this research seeks to answer a fundamental question: Which model of quality assurance allows for the integrated monitoring of innovation, curricular development, and a student-centred learning process within a naval military context?

The following sections will detail the methodology and diagnostic findings of a mixed-methods study involving a census of applied to cadets (n=170) and academic faculty (n=22). Building on this diagnosis, the paper proposes a new Integrated Quality Assurance System (SIGQ) structured around integrative, core, and support macro-processes, designed to bridge the gap between academic quality work and the goal of defence effectiveness.

2 THEORETICAL FRAMEWORK

2.1 The Evolution and Multi-dimensionality of Quality

The conceptualisation of 'Quality' in higher education is notoriously elusive. As Vroeijenstijn [6] noted, searching for a single definition is often a futile endeavour, as the concept is entirely dependent on the perspective and values of the stakeholders involved. Within the European context, the debate has traditionally oscillated between two perspectives: one rooted in criterial thinking – where quality is a measurable, objective fact – and another based on personal experience, where quality is determined by the subjective interactions of participants [7].

The Portuguese Quality Assurance Agency (A3ES) adopts a holistic view, defining quality as a "multi-dimensional, multi-level, and dynamic concept" that must align with the institutional mission and the standards of a specific disciplinary system. However, for a military academy, this academic definition must be synthesised with the pragmatic notion of "adequacy for use" [1]. In this context, quality is not merely the absence of administrative errors, but the presence of the "human touch in quantity" [8], ensuring that the educational output possesses the specific technical and moral virtues required for military leadership.

2.2 The Bologna Reform as a Paradigm Shift in MHE

The Bologna Process, established in 1999, represented a tectonic shift in European Higher Education, promoting the harmonisation of degrees, student mobility, and transparent quality standards. For Military Higher Education (MHE), this reform was transformative. It required academies to move beyond traditional "instructional" models toward a "learning" model [9]. This shift is anchored in Learning Outcomes – explicit statements of what a student is expected to know, understand, and demonstrate at the end of a period of learning [10].

The implementation of internal quality assurance systems (IQAS) became a legal mandate (as per Decree-Law no. 369/2007), forcing institutions to professionalise their management. As argued by Ewell [5], centralising the process on the student through learning outcomes is not merely a pedagogical preference but a strategic necessity. In MHE, this transparency allows for a clearer alignment between the national qualification frameworks (QNQ) and the specific professional profiles required by the Armed Forces, ensuring that academic credits correspond to actual operational competence.

Comentado [1]: É nisto que nos devemos ancorar!!!!
Ao invés do cortejo de vaidades só para compliance com a A3ES

Comentado [2]: Nem sei se percebi bem isto :0)

Formatou: Realce

2.3 Linking Quality to Operational Readiness

The goal of any naval academy is to provide a "product" that is fit for the high-stakes environment of maritime-naval operations. The Navy Strategic Directive 2022 [3] defines the ideal force as "holistic, ready, and technologically advanced," necessitating-requiring an education system that prioritises emerging technologies and innovative leadership paradigms. The friction arises when the academic staff – often military officers appointed based on operational experience rather than pedagogical training – fail to materialise that experience into effective learning processes. This is further aggravated by non-military background teaching staff which lacks the navy real world experience, as no education can replace experience, a truth hardly well received by pure academic staff everywhere. If the IQAS focuses solely on bureaucratic indicators, it ignores the critical link between student motivation and defence effectiveness. Therefore, the proposed model must be "epistemically anchored" in Naval Military Sciences. This ensures that quality management is not an external academic imposition but a core component of Operational Readiness, where a high-quality education functions as a safeguard against the risks of strategic uncertainty and technological obsolescence, reinforcing the strategic nexus between quality management and readiness established in recent naval education literature [10; 11].

3 METHODOLOGY

3.1 Research Design and Theoretical Approach

The investigative framework of this study is firmly rooted in the fields of Strategic Management and Operational Research. It employs a single-case, mixed-methods design, chosen for its capacity to offer a "thick description" of the institutional reality at the Naval Academy. By combining quantitative breadth with qualitative depth, the research aim is to move beyond mere descriptive statistics towards a correlational analysis between educational inputs and operational readiness outputs.

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3.2 Data Collection and Sampling Strategy

The study used a multi-layered sampling strategy to capture the perceptions of all primary stakeholders within the academic ecosystem:

- **Student Body (Cadets):** A comprehensive census was conducted among all cadets from the first to the fourth year. This included all academic branches: Navy, Marines, Naval Administration, and Naval Engineering. A total of 170 valid responses were collected, representing a 100% response rate of the available population during the first semester of the 2022/2023 academic year.
- **Academic Staff:** The survey was distributed to twenty-three lecturers, selected based on their involvement in core curricular units. With twenty-two valid responses (96%), the sample provided a balanced view between civilian PhD holders (52%) and military officers (48%), the latter primarily holding master's degrees with extensive operational experience.
- **Qualitative Insights:** To contextualise the quantitative findings, documentary analysis was performed on the Navy Strategic Directive 2022 and internal quality manuals (MAESCOLNAV 1002). Additionally, elite interviews were conducted with top-level management to understand the strategic pressures facing the institution.

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3.3 Instrument Development and Scientific Validation

A rigorous three-phase validation process was implemented to ensure the reliability of the survey instruments:

- **Phase 1 (Design):** Questionnaires were adapted from the Academy's existing self-evaluation tools, structured into six distinct sections: Curricular Units, Teaching Quality, Services and Infrastructure, Global Quality of Education, and Student Motivation.
- **Phase 2 (Pilot Trial and Kappa Validation):** To eliminate "central tendency bias," a 6-level Likert scale was used. The instruments were then assessed via a pilot study. Reliability was confirmed using Cohen's Kappa, a robust measure that accounts for agreement occurring by chance. The student survey reached a kappa of 0.79, while the faculty survey reached 0.81, both falling within the "Very Good" agreement interval.

Comentado [5]: Deixava só "Scientific validation". Os ingleses não usam muito isto do instrument

Formatou: Realce

- **Phase 3 (Implementation):** Surveys were administered in person to students and digitally to staff to maintain anonymity and encourage candid feedback.

3.4 Data Processing and Triangulation

Quantitative analysis was performed using SPSS. The study moved beyond simple averages, employing:

- **Boxplot Analysis:** To identify medians, quartiles, and outliers, providing a visual representation of the variance in perceptions between different years and scientific areas.
- **Scale Conversion:** Data were converted to a 0 – 20 scale to align with the Portuguese academic grading system, facilitating a direct comparison between student perceptions and actual academic performance.
- **Longitudinal Research Data:** Six years of scientific production data (2016 – 2022) from the Naval Research Centre (CINAV) were integrated to evaluate the "Research-Teaching" nexus.

4 DIAGNOSIS AND RESULTS

4.1 Perception of Teaching Quality and Excellence

The analysis of the "Teaching Quality" dimension revealed a significant gap between staff and student perceptions. While the Academy aspires to "Instructional Excellence," the data paints a different picture. Drawing on legal documents and using the 0 – 20 scale conversion, the study established a minimum threshold for excellence at 18/20.

- **Perceived Excellence:** Only 13% of the academic staff were classified by students as achieving "Excellent" performance.
- **Global Average:** The average perception of teaching quality across all scientific areas was 15/20 ("Good"), falling significantly short of the excellence benchmark.
- **Scientific Area Variance:** The area of "Naval Military Sciences" — the core of the Academy's mission — achieved only a "Good" rating (15/20), which is particularly concerning given its role in direct operational preparation. Only "Mechanical Engineering" reached the excellence threshold with an 18/20 rating.

4.2 Student Motivation and Retention Risks

The most critical finding of the diagnostic phase pertains to the future sustainability of the naval officer corps.

- **Reapplication Intent:** A staggering 24% of the surveyed cadets stated they would not reapply to the institution if given the choice. This figure represents nearly a quarter of the future officers cadre.
- **Yearly Distribution:** The fourth-year students — those closest to entering active service — exhibited the lowest motivation levels (3.43 on a 1 to 6 scale) and the highest percentage of negative reapplication intent.
- **Attribution of Dissatisfaction:** Of the reasons provided for this lack of motivation, 53% were directly attributed to internal factors within the Naval Academy, such as perceived lack of academic rigour, poor alignment between teaching and future duties, and inadequate infrastructure.

4.3 Infrastructure and Services: The "Hygiene Factors"

The study identified a direct correlation between the quality of services/infrastructure and overall student motivation.

- **Infrastructure Deficiencies:** Critical dissatisfaction was noted regarding the heating of classrooms and laboratories, as well as the conservation of student accommodation.

Comentado [6]: Shows?

Comentado [RR7]: Com base o Art. 17º do DL nº42/2005, de 22 de fevereiro e a alínea 4, do artigo 31º do documento Normas Regulamentares dos Ciclos de Estudos Conducentes ao Grau de Mestre em Ciências Militares Navais da Escola Naval

Comentado [RR8]: Para justificar o porque do intervalos de valores de 18-20 ser considerado Excelente, e não se pensar que esses valores foram definidos ao mero acaso...(Fonte: Tese Mestrado pág.50 e 51)

Comentado [9]: O Military é redundante. Em inglês diz-se "Naval Sciences Degree"

Comentado [10R9]: O "Naval" já inclui o militar. E é diferente da Maritime Industry (Marinha Mercante)

- **Impact on Learning:** Staff perceptions of laboratories were more negative than those of students, with a mode value of 1/6 for laboratory heating. The data suggest that these "hygiene factors" (Herzberg) are currently acting as significant demotivators, overshadowing the academic experience.

4.4 The Research-Teaching Nexus (CINAV Data)

The longitudinal analysis of the Naval Research Centre (CINAV) data (2016 – 2022) exposed a weakening research culture.

- **Scientific Output:** There has been a progressive 55% decrease in scientific production over the analysed period.
- **Student Engagement:** Despite the Academy's mission to integrate research into the learning process, the percentage of scientific production involving students dropped to a marginal 2% (overall) by 2022.
- **Staff Involvement:** Only 17% of the total researchers at CINAV are members of the Academy's own academic staff, indicating a disconnect between the teaching faculty and the research centre.

Comentado [11]: Something related with the intense long ours of in-class attendance

4.5 Synthesis of the Diagnosis

The triangulation of these results confirms that the current Quality Assurance system is failing to function as an effective "early-warning" mechanism. The systemic low motivation and the perception of a non-excellent teaching corps represent a significant risk to Operational Readiness. The lack of coordination between military activities (*Corpo de Alunos*) and academic requirements has resulted in an overloaded student body that values neither the academic nor the research components of their training as much as the institution requires for its future technological needs.

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5 PROPOSED INTEGRATED QUALITY ASSURANCE SYSTEM (SIGQ)

5.1 The Strategic Shift: Process-Based Approach

The proposed Integrated Quality Assurance System (SIGQ) for the Naval Academy moves away from a static, dashboard-only approach towards a dynamic, process-based management model. This model is designed to align institutional activities with the Navy's Strategic Directive (DEM) through three distinct levels of strategic planning: Strategic (top management), Tactical (intermediate coordination), and Operational (task execution). The proposed architecture, illustrated in Figure 1, demonstrates the interconnection between different planning levels and the continuous feedback loop aimed at achieving operational readiness.

Macro-process Model of the Integrated Quality Assurance System (SIGQ)



Figure 1 - Macro-process Model of the Integrated Quality Assurance System (SIGQ) for the Portuguese Naval Academy.

The system is structured into three categories of macro-processes:

- **Integrative Processes (Strategic):** These govern the Academy's top-level management, focusing on leadership, the definition of quality policies, and the execution of internal and external audits.
- **Core Processes (Tactical):** These constitute the "heart" of the mission, integrating the Corps of Cadets (military training), Teaching and Learning (academic), and Research and Development (scientific).
- **Support Processes (Operational):** These ensure the provision of necessary resources, including human capital, technological infrastructure, and financial management.

5.2 Core Innovative Initiatives

The SIGQ introduces several initiatives designed to address the specific vulnerabilities identified in the diagnosis:

- **Integrative Planning (PI 01):** Implements the PDCA (Plan, Do, Check, Act) cycle as a continuous management tool. This ensures that findings from student surveys lead to mandatory corrective actions that are reviewed by the Academy's Commander.
- **Curricular Management (PN 03):** Mandates a shift towards curricula focused on disruptive technologies and the specific professional profiles required by the fleet. It includes a more rigorous pedagogical evaluation of military staff, moving beyond operational experience to assess actual teaching effectiveness.
- **Research Integration (PN 04):** To revitalise the scientific culture, the model proposes mandatory student involvement in research projects as a prerequisite for certain curricular units, aiming to reverse the decline in CINAV's production.
- **Environmental and Social Sustainability (01.4):** In line with UN Sustainable Development Goals, the model includes indicators for energy efficiency and infrastructure modernisation, addressing the "hygiene factor" issues (such as heating) that currently impact cadet motivation.

5.3 Monitoring and Early Warning Mechanisms

The SIGQ is designed to function as an organisational "early-warning" system. Rather than producing post-facto reports, it utilizes key quality indicators (KQIs) to provide real-time data on:

- **Talent Retention Risks:** Flagging years or branches where motivation falls below the 3.43/6 threshold.
- **Scientific Stagnation:** Monitoring the research-to-teaching ratio to ensure the faculty remains at the forefront of naval technology.
- **Interinstitutional Synergy:** Evaluating the flexibility and effectiveness of partnerships, such as the relationship with the Faculty of Medicine (FMUL), to ensure external students remain integrated into the military ethos.

5.4 Alignment with National (A3ES) Standards

While tailored to the military context, the SIGQ is fully mapped against the thirteen reference standards of the Portuguese Accreditation Agency (A3ES). This ensures that the Naval Academy remains a certified institution within the EHEA while the SIGQ remains "epistemically anchored" in Naval Military Sciences – ensuring that every academic process serves the goal of sea-going readiness.

6 DISCUSSION:

The transition from a compliance-oriented quality model to the proposed Integrated Quality Assurance System (SIGQ) represents more than a structural change; it is a shift in the Naval Academy's institutional philosophy of the Naval Academy. The diagnosis presented in this research highlights a "quality paradox": while the institution is legally compliant with EHEA standards, its internal metrics indicate significant risks to its primary mission – preparing officers for naval warfare.

6.1 The Operational Cost of Low Student Motivation

The finding that 24% of cadets would not reapply to the Academy is perhaps the most critical indicator of institutional "ill-health". In a military context, motivation is not merely a psychological state but a component of **Operational Readiness**. If a quarter of the future officer corps enters active service disillusioned, the Navy faces an immediate crisis in talent retention and leadership quality. The SIGQ addresses this by monitoring "hygiene factors" – such as infrastructure and administrative support – recognising that poor living and learning conditions directly degrade the educational experience and, consequently, the professional commitment of the cadet.

6.2 Pedagogical Excellence and Technology Transfer

The fact that only 13% of the staff are-is perceived as excellent, coupled with the "Good" rating in the core area of Naval Military Sciences, suggests a failure in the transfer of operational knowledge. The Navy's *Strategic Directive 2022* demands officers capable of operating technologically complex platforms. However, if military lecturers cannot effectively materialise their sea-going experience into structured Learning Outcomes, the Academy fails to bridge the gap between tradition and innovation. The SIGQ's focus on pedagogical evaluation, and the "Research-Teaching" nexus is designed to force this evolution, ensuring that lecturers are not just experienced officers but effective educators.

6.3 Research as a Strategic Lever

The 55% decline in scientific production at CINAV and the marginal 2% student involvement in research projects representrepresents a strategic vulnerability. Modern naval warfare is increasingly dependent on the rapid integration of disruptive technologies – such as autonomous systems and cyber defence. An officer corps that is detached from the research process during its formative years will struggle to lead a "technologically advanced Navy". By integrating research into the core macro-processes of the SIGQ, the Academy re-establishes the scientific method as a tool for operational problem-solving.

6.4 The Early-Warning Paradigm

Ultimately, the value of the SIGQ lies in its ability to function as an organisational "Early-Warning" system. By monitoring KQIs (Key Quality Indicators) across integrative, core, and support processes, the Academy can detect systemic failures — such as the drop in motivation among fourth-year cadets — before they translate into personnel shortages or operational incompetence within the fleet. In this regard, Quality Assurance is no longer an academic requirement but a pillar of maritime security and defence effectiveness.

7 CONCLUSION

The research presented in this paper confirms that quality assurance in Military Higher Education is far more than a bureaucratic formality; it is a critical driver for institutional health and national operational readiness. Through a rigorous mixed-methods study, we have identified a significant "readiness gap" at the Portuguese Naval Academy, characterised by a perceived lack of instructional excellence (with only 13% of lecturers rated as excellent) and a concerning risk to talent retention (evidenced by the 24% non-reapplication intent).

The proposed **Integrated Quality Assurance System (SIGQ)** offers a robust framework to address these vulnerabilities. By shifting to a process-based management model — structured into integrative, core, and support macro-processes — the Academy can move beyond static data collection towards a dynamic "early-warning" mechanism. This model ensures that academic quality is epistemically anchored in Naval Military Sciences, directly linking student motivation, pedagogical effectiveness, and scientific production to the strategic goals of the Navy. [This study helps bridge the gap between quality assurance theory and defence capability development, positioning QA as an instrument of strategic governance rather than mere administrative compliance.](#)

Comentado [S12]: Reforçar o contributo do trabalho.

While this study focuses on a single national case, the framework is designed to be transferable to other European military academies navigating similar strategic uncertainties within the Bologna architecture. The integration of "hygiene factors" into quality monitoring and the revitalisation of the research-teaching nexus are universal imperatives for any institution tasked with forming leaders for technologically complex and high-stakes environments.

Future work should focus on the digital operationalisation of this model. Specifically, the implementation of **Business Intelligence (BI)** tools would allow for the real-time monitoring of Key Quality Indicators, facilitating even more rapid and evidence-based decision-making by naval command. Ultimately, by centring the educational process on the student-officer and ensuring a culture of continuous improvement, the Naval Academy can safeguard its role as the forge of the "holistic and technologically advanced" force required for the future.

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REFERENCES

- [1] Sá, P. (2019). *A Gestão da Qualidade no Ensino Superior em Portugal*. Braga: Universidade do Minho. [\(Portuguese\)](#)
- [2] Martins, J. (2011). *Metodologia de Autoavaliação Aplicada ao Sistema de Ensino Universitário e Politécnico da Escola Naval*. Alfeite: Escola Naval. [\(Portuguese\)](#)
- [3] Marinha Portuguesa. (2022). *Diretiva Estratégica da Marinha 2022*. Lisboa: Estado-Maior da Armada. [\(Portuguese\)](#)
- [4] J. Ricardo and I. Soares, "Quality Assurance as a Tool to Enhance Student-Centred Learning in Military Higher Education – Case Study in Portuguese Naval Academy", EDULEARN22 Proceedings, pp. 6604-6607, 2022.
- [5] Ewell, P. (2016). *A Strategic Guide to Learning Outcomes*. Washington DC: Council for Higher Education Accreditation.

- [6] Vroeijenstijn, A. I. (1995). *Improvement and Accountability: Navigating between Scylla and Charybdis*. London: Jessica Kingsley Publishers.
- [7] Fernandes, D. (2013). *Qualidade e Avaliação no Ensino Superior*. Lisboa: Texto Editores. [\(Portuguese\)](#)
- [8] Demo, P. (2001). *Qualidade Moderna*. São Paulo: Editora Atlas. [\(Portuguese\)](#)
- [9] Soares, I. (2018). *Learning Outcomes no Ensino Superior Português: Perfis de Competências da Área das Ciências Empresariais*. Lisboa: Universidade Europeia. [\(Portuguese\)](#)
- [10] Adam, S. (2008). *Learning Outcomes Current and Future Considerations*. Edinburgh: Conference on Learning Outcomes.
- [11] R. Saraiva, I. Soares, and P. Água, "Exploring the Nexus between Strategic Quality Management and Operational Readiness in Military Higher Education", *EDULEARN2024 Proceedings*, pp. 10148-10154, 2024.
- [12] Ricardo, J. G. R. (2023). *Sistema integrado de garantia da qualidade do ensino na Escola Naval: criação de um novo modelo de qualidade*. (Master Thesis). Alfeite: Escola Naval. [\(Portuguese\)](#)