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Transversal

Assessing the Students
Satisfaction

Sequence of Descriptive
Statistics

Drone –A Tool of Modern
Teror



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IMAGE: ACROPOLIS OF ATHENS,
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Visible Infinity

Dr. Joseph Wiliam Fisher

ABSTRACT

There can only ever have been, or that will ever continue to be one infinite visible physical condition that has endured, and will continue to endure eternally. The physicists' contention that visible matter and invisible dark matter and empty space have somehow managed to coexist at the same time after the supposedly finite big bang explosive commencement of the universe billions of light years ago is utterly invalid. There could never have been any empty space. The visible space bar on a visible keyboard does not add a space between visible words. Depressing it merely adds an extended contrast in hue between the letters of the words.

Keywords: flattish, big, bang, theory, refutation.

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Dr. Joseph William Fisher

ABSTRACT

There can only ever have been, or that will ever continue to be one infinite visible physical condition that has endured, and will continue to endure eternally. The physicists' contention that visible matter and invisible dark matter and empty space have somehow managed to coexist at the same time after the supposedly finite big bang explosive commencement of the universe billions of light years ago is utterly invalid. There could never have been any empty space. The visible space bar on a visible keyboard does not add a space between visible words. Depressing it merely adds an extended contrast in hue between the letters of the words. There is no empty space between the stars and the planets. There is merely a contrast in visible physical appearance. As there are an infinite number of visible stars, there is no way they could be assembled in only finite types. There is no way that any two stars could be separated by billions of finite miles of empty space. All one has to do is look up at the night sky in order to visually verify that the glaring neon white stars are clearly in view seen against the stark contrast of the visible black sky.

Keywords: flattish, big, bang, theory, refutation.

I. THE ONE AND ONLY

There has only ever been visible infinity. Although visible humans have devised what they consider to be finite languages, it should be obvious that an infinite number of languages could be humanly devised. Supposedly, the English language provides the most reasonable expository information, but the English language contains an infinite number of words and new words are added to the dictionaries annually. The English language contains far more words than anyone would ever need and quite a lot of these words are seldom or never used.

Just as all of the visible physicists have been wrong about the simultaneous existence in the universe of duality of empty space-(invisible) time and matter, so too has the English language fluent visible populace been misinformed about the simultaneous coexistence of right and wrong. No part of infinite information could be be finitely right or finitely wrong. Infinite information can only remain infinite information. You have to understand that visible computer operators use visible computers to spew out an enormous amount of visible written information and only a minuscule amount of that visible written information is ever read and understood by visible human beings. According to the physicists, there could not be an infinite number of stars because if that were the case, there would be a total glare and no black sky. Actual infinity cannot be defined and there would be total astral glare only if there were a total number of stars.

According to the Encyclopedia Britannica entry posted at url: <https://www.britannica.com/science/infinity-mathematics> "infinity, the concept of something that is unlimited, endless, without bound. The common symbol for infinity, ∞ , was invented by the English mathematician John Wallis in 1655. Three main types of infinity may be distinguished: the mathematical, the physical, and the metaphysical. Mathematical infinities occur, for instance, as the number of points on a continuous line or as the size of the endless sequence of counting numbers: 1, 2, 3,.... Spatial and temporal concepts of infinity occur in physics when one asks if there are infinitely many stars or if the universe will last forever. In a metaphysical discussion of God or the Absolute, there are questions of whether an ultimate entity must be infinite and whether lesser things could be infinite as well." Rucker, Rudy. "infinity". Encyclopedia Britannica, 10 Nov. 2022, <https://www.britannica.com/science/infinity-mathematics>. Accessed 10 February 2023.

Why would an unlimited visible physical condition need to be represented by a limited finite symbol? All symbols can be infinitely reproduced. An unlimited visible infinity could not possibly have three finite limiting types one of which was invisible. Visible English mathematician John Wallis ought to have realized that an infinite number of finite visible numbers have been humanly created, and that each one of these humanly created visible finite numbers could contain an infinite number of visible finite fractions and decimals. Visible Physicists ought to realize that there are an infinite number of visible physicists who have written an infinite number of visible books concerning physics. Visible Philosophers should be aware that an infinite number of visible philosophers have produced an infinite amount of visible material about invisible philosophy. Practice of law is supposed to be limited, but an infinite number of visible lawyers have so far been able to produce an infinite number of visible Federal, state, and local law books. Nobody seems to know if most of these laws are ever broken. Reported crime statistics never include the huge number of laws that are on the visible books.

II. THE FIX IS IN

One of the many puzzles concerning human behavior is the enigmatic fact that roughly half of the visible globe's visible population has decided that the fixed number one would be visibly represented by a short straight vertical line with a little left hand side hook attached to its top, whereas the oriental half felt more knowledgeable if they always depicted their fixed number one as being a short wavy horizontal line. All agreed on the wondrous logic of being able to start counting anything and everything from the fixed number one. If human logic had to have a fixed start, surely the Universe had to have had a fixed commencement. There had to have been a first man and a first woman. Although, according to the physicists, matter and empty space emerged simultaneously from out of the big bang explosion that supposedly occurred 13.75 light years ago from today, give or take a billion or so light years either way: why could the first man and woman not have emerged simultaneously ?. Scientists

discovered the somewhat fixed magnetic pole, even though it actually moved about. Astronomers spotted the fixed North Star. But they completely overlooked the fact that there was no empty space anywhere in the infinite visible Universe. And there was absolutely no amount of finite invisible "dark matter."

At 09:42 AM US Eastern time on Tuesday November 8, 2022, , I entered the word INFINITY into the visible Google Scholar Search Engine. A drop down list appeared containing the terms: infinity control; infinity norm; infinity specs; infinity war, and infinity controller. The Google Scholar Search Engine informed me that it had found 2,670,000 results (0.13 sec) Just as dual states of matter and space could never have existed simultaneously, so to the dual humanly supposed finite and infinite states ought never to exist simultaneously.

III. ONLY ONE VISIBLE INFINITY HAS EVER EXISTED AND IT WILL DO SO ETERNALLY

The visible Earth is not "round like an orange." Due to the activity of visible earthquakes and visible volcanoes, the visible earth always has an infinite fluctuating shape. The only reason the visible earth appears to be circular when seen from a distance is because humans are possessed of circular eyeballs or they use cameras with circular lenses in their telescopes to photograph the earth from a distance. The visible earth's surface is not exactly 24,000 miles in circumference, therefore there cannot be exactly 24 1,000 mile wide invisible straight lined time zones. Indubitably, the visible earth does spin on its axis, but each infinite rotation is unique in acceleration performed and distance traveled. The visible earth does orbit the visible sun, but each infinite orbit is unique in infinite duration. The visible earth undulates as it orbits the visible sun and each upper and lower undulation is of unique infinity. This infinity prohibits any exact 24 hour 7 day 365.25 day year from ever happening.

Visible university students are taught by their visible mathematic professors that there are three finite dimensions. The visible professors usually

provide proof of this by displaying a short straight black horizontal line, and a short straight black vertical line, and a short black diagonal line on a visible blackboard or printed on the page of a visible physics or mathematics textbook. There is no way the universe could ever have a finite length, width, depth or duration. The real VISIBLE Universe has only ever had ONE INFINITE DIMENSION. A cube, a sphere and a pyramid are supposed to have three dimensions, but as only one side of a cube or a sphere or a pyramid can be seen at any given moment, one will only be able to see a flat moving colored square shape, or a flat moving colored circular shape, or a flat moving colored triangular shape when actually looking at a cube, a sphere or a pyramid. Other infinite flat visual elements of the scene will always be present for only visible infinity has ever existed. Visible ships can only sail on a flat visible body of water. All visible airplanes can only take off and land on visible flat ground. All visible sports can only be played by visible contestants and observed by visible spectators if played on visible flat surfaces. All visible cities can only be built on visible flat ground. Visible ice can only form on a visible flat surface and although due to climate change, a considerable amount of the visible polar ice caps have melted, a flat couple of thousand square miles or so of flat visible ice surface remains on the visible North and South Polar ice caps. Visible sand storms and visible tornadoes can only travel over visible flat ground. All visible vegetation can only sprout outwardly from visible flat land. Because the infinite visible Universe is indubitably flat, the visible Earth is just as flat. It is important to note that the visible earth is only infinitely flat as this allows it to have visible infinite mountain chains. Only visible infinity has ever existed, or will ever continue to exist eternally. If the earth were totally flat, it would be invisible and incapable of sustaining any visible form of life. Perhaps a more accurate word to describe the visible earth's physical disposition might be the contrived word flatish.

There is no such a thing as invisible time. An infinite number of visible timepieces have been manufactured, no two of which could ever record identical moments in time. An infinite number of

visible experiments have been conducted by visible scientists, no two visible experiments of which have ever provided identical reported results, proving that exact humanly contrived predictability is impossible. Only infinite approximation has ever emerged from these visible experiments. Only infinite approximation of time has ever been achieved by visible time piece observation.

IV. CONCLUSION

Every visible person who has ever been born on the visible earth has had unique visible fingerprints and unique RNA and DNA. It follows that all they will ever hear, smell, touch, taste, feel and see for all of their lives has to be unique. It cannot be invisibly evil or invisibly good. It can only be observably unique.

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Inquiry Work as a Transversal Axis in the Teaching Sequence of Descriptive Statistics

Maria Alejandra Santarrone

Universidad Nacional del Litoral

ABSTRACT

The objective of the work is to present an essential part of the design of the descriptive statistics teaching sequence, carried out within the framework of the master's thesis in university teaching that seeks to promote the learning of the fundamental ideas of parametric statistical inference in the students of the Department of Statistics of the Public Accountant career at the Faculty of Economic Sciences of the National University of the Litoral of the Argentine Republic.

Keywords: descriptive statistics- inquiry- skills.

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Inquiry Work as a Transversal Axis in the Teaching Sequence of Descriptive Statistics

Trabajo de Indagación Como eje Transversal en la Secuencia de Enseñanza de la Estadística Descriptiva

Maria Alejandra Santarrone

ABSTRACT

The objective of the work is to present an essential part of the design of the descriptive statistics teaching sequence, carried out within the framework of the master's thesis in university teaching that seeks to promote the learning of the fundamental ideas of parametric statistical inference in the students of the Department of Statistics of the Public Accountant career at the Faculty of Economic Sciences of the National University of the Litoral of the Argentine Republic.

Although the proposed sequence is not approached through a project, its evolution tends to enable students to address a research problem and work on it from the general steps that are taken in a statistical study. We believe it is a sequential, dynamic, and alternative way for students to develop the statistical proficiency expected in sequencing.

Keywords: descriptive statistics- inquiry- skills.

Author: Magister en Docencia Universitaria. Universidad Nacional del Litoral, Facultad de Ciencias Económicas, Santa Fe, Santa Fe, Argentina.

RESUMEN

El trabajo tiene como objetivo dar a conocer una parte esencial del diseño de la secuencia de enseñanza de la estadística descriptiva, realizada en el marco de la tesis de maestría en docencia universitaria que persigue favorecer el aprendizaje de las ideas fundamentales de la inferencia estadística paramétrica en los

alumnos de la cátedra de estadística de la carrera de Contador Público en la Facultad de Ciencias Económicas de la Universidad Nacional del Litoral de la República Argentina.

Si bien la secuencia propuesta no se aborda a través de un proyecto, sí su devenir tiende a posibilitar que los estudiantes aborden un problema de indagación y lo trabajen a partir de los pasos generales que se dan en un estudio estadístico. Creemos que es una manera consecutiva, dinámica y alternativa para que los estudiantes desarrollen la competencia estadística esperable en la secuencia.

Palabras Clave: estadística descriptiva. indagación. competencias.

I. INTRODUCCIÓN

Comencemos teniendo en cuenta que la estadística como ciencia es relativamente joven, hasta hace unos 65 años existía una división clásica entre estadística descriptiva y estadística inferencial. La división se centraba en que la estadística descriptiva, se utiliza para describir los datos, resumirlos y presentarlos de forma que sean fáciles de interpretar, con interés en el conjunto de datos dados y no en el de extender las conclusiones a otros datos diferentes; mientras que la estadística inferencial trata de obtener conocimientos sobre la población estadística, a partir de la información disponible de una muestra, utilizando como herramienta matemática el cálculo de probabilidades y los métodos desarrollados por la estadística matemática.

Aunque en la esfera científica esta separación ya ha sido saldada, en la educativa aún persiste.

En Behar Gutiérrez y Grima Cintas (2001), se sostiene que la educación estadística ha trabajado sobre las disociaciones que esta separación ha producido, como ser: estadística versus matemática, estadística versus probabilidad, estadística versus análisis exploratorio de datos.

En la actualidad la mayoría de los enfoques de enseñanza en primeros cursos universitarios de estadística, para carreras no matemáticas, empiezan con análisis de datos para problemas contextualizados del mundo real y se hace énfasis en la importancia y utilidad, al tiempo que se pone en evidencia el alcance y las limitaciones de posibles inferencias. De manera posterior se da la teoría de probabilidad para poder arribar luego a la construcción teórica necesaria para los conceptos de la inferencia estadística paramétrica. Esto, si bien es superador, puede generar aún atomización de los contenidos entre la estadística descriptiva y la inferencial.

Llevar a cabo procesos de inferencia estadística requiere tiempo, puesto que implica el desarrollo de habilidades cognitivas y específicas de pensamiento matemático que incluso deben haberse estimulado desde los niveles de educación básica y secundaria, aunque los espacios para estos desarrollos en los contextos escolares suelen ser poco frecuente.

Por ejemplo, en relación a errores presentados por investigadores experimentales, como ser la generalización inadecuada del razonamiento en lógica deductiva al razonamiento en la inferencia, en Batanero (2001) se sostiene que:

Podríamos pensar que esta situación se debe a una enseñanza insuficiente del tema, a pesar de que la estadística es una asignatura obligatoria en la mayor parte de las licenciaturas ingenierías. Sin embargo, a veces estos errores se encuentran también en personas con fuerte preparación estadística (Morrison y Henkel, 1970) (p.36).

Por lo tanto, lograr apropiarse de la lógica necesaria para la inferencia, en ocasiones,

requiere más de un cuatrimestre de educación universitaria puesto que muchos estudiantes en ese tiempo sólo alcanzan a establecer las bases iniciales (muchas veces reducidas al cálculo estadístico), las que requieren afianzarse de manera posterior con el fin de que el estudiante pueda emplear o aplicar la inferencia estadística en casos particulares en su futuro profesional.

En la Facultad de Ciencias Económicas de la UNL, la cátedra de estadística se dicta en un solo cuatrimestre, y salvo para la carrera de Licenciado en Economía, los alumnos no tienen otro curso superior de estadística.

Es por ello, que atendiendo a todo lo expuesto, creemos necesario utilizar estrategias pedagógicas que permitan guiar al estudiante a la construcción de aspectos teóricos a partir de aspectos prácticos en los que se pueda aplicar la inferencia estadística a contextos significativos. En particular en esta investigación se desea explorar y dar luz a cómo la enseñanza de estadística descriptiva, pensada para favorecer las ideas fundamentales de la inferencia estadística paramétrica (Meyer, 2005) puede resolver alguna de las problemáticas que se plantean en la apropiación del razonamiento inferencial estadístico.

II. INTERROGANTES, OBJETIVOS E HIPÓTESIS

Los interrogantes que dan lugar al trabajo de investigación son:

- ¿Cuáles son las relaciones conceptuales que se pueden establecer entre los contenidos de la estadística descriptiva e inferencial para el aprendizaje significativo de ambas ramas?
- ¿De qué forma se puede secuenciar la enseñanza de la estadística descriptiva para brindar un andamiaje al alumno que posibilite el aprendizaje de las ideas fundamentales en la inferencia estadística paramétrica?
- ¿Qué instrumentos son pertinentes para evaluar los alcances de la puesta en práctica de una secuencia de enseñanza de la estadística descriptiva, en relación con el aprendizaje de

las ideas fundamentales de la inferencia estadística paramétrica?

Las anteriores preguntas, permiten arribar al planteo de un objetivo general y tres específicos:

Objetivo general: Diseñar y evaluar una secuencia de enseñanza de la estadística descriptiva que favorezca el aprendizaje de las ideas fundamentales de la inferencia estadística paramétrica, en los alumnos de la cátedra de estadística de la FCE-UNL.

Objetivos específicos:

- Analizar los conceptos específicos de la estadística descriptiva que serán parte de la secuencia de enseñanza para favorecer el aprendizaje de las ideas fundamentales de la inferencia estadística paramétrica, en los alumnos de la cátedra de estadística de la FCE-UNL.
- Elaborar la secuencia para la enseñanza de los conceptos definidos en O1, que responda al objetivo general planteado.
- Evaluar la secuencia de enseñanza, a través de un análisis retrospectivo, para el reconocimiento de puntos de mejora futuros.

Mientras que las hipótesis son las siguientes:

H1: Existen relaciones conceptuales entre los contenidos de la estadística descriptiva e inferencial que favorecen el aprendizaje significativo de ambas ramas. (Nivel de concreción teórica)

H2: Secuenciar la enseñanza de la estadística descriptiva, en base a las relaciones conceptuales que se establecen en H1, permite a los alumnos alcanzar mejores niveles de comprensión en las ideas fundamentales de inferencia estadística paramétrica. (Nivel de concreción Operativa).

III. ENCUADRE TEÓRICO Y METODOLÓGICO

Con respecto a su objetivo, este proyecto de investigación plantea el desarrollo de una secuencia de enseñanza desde la teoría de situaciones didácticas planteada por Brousseau (1986).

La teoría está sustentada en una concepción constructivista, en el sentido piagetiano del aprendizaje. Brosseau (1986) lo caracteriza de la siguiente manera:

El alumno aprende adaptándose a un medio que es factor de contradicciones, de dificultades, de desequilibrios, un poco como lo hace la sociedad humana. Este saber, fruto de la adaptación del alumno, se manifiesta por respuestas nuevas que son la prueba del aprendizaje (p.59).

Siguiendo a Brosseau (1999), el término “situación” de un sujeto con cierto medio es un modelo, que determina a un conocimiento como el recurso del que dispone el sujeto para alcanzar o conservar en este medio un estado favorable. Se sostiene que algunas de estas situaciones requieren conocimientos y esquemas previos, pero hay otras, que ofrecen una posibilidad al sujeto para construir por sí mismo un conocimiento nuevo en un proceso genético.

Es así que la situación didáctica se establece como el conjunto de relaciones que se dan de manera implícita o explícita entre un grupo de alumnos, un entorno (que puede incluir materiales o instrumentos) y el profesor, con el fin de que los alumnos aprendan.

El armado de la situación didáctica plantea un modelo de interacción que conduce, desde el punto de vista metodológico, a la ingeniería didáctica en términos de Artigue (1995). Se trata del diseño y evaluación de secuencias de enseñanza de la matemática teóricamente fundamentadas, con la intención de provocar la emergencia de determinados fenómenos didácticos, al tiempo que se logra elaborar recursos para la enseñanza científicamente experimentados.

Como características principales de la ingeniería didáctica en su sentido originario se destacan:

- Está basada en intervenciones didácticas en clase, es decir, sobre la concepción, realización, observación y análisis de secuencias de enseñanza.
- La validación es esencialmente interna, fundada en la confrontación entre el análisis a

priori y a posteriori (y no validación externa, basada en la comparación de rendimientos de grupos experimentales y de control).

Tomando a Godino (2014) en esta investigación se trabaja con una visión ampliada de la ingeniería didáctica, entendida como una clase específica de investigación basada en el diseño, en la que las herramientas teóricas que sirven de base en las distintas fases del proceso metodológico forman parte del enfoque ontosemiótico (EOS) del conocimiento y la instrucción matemáticos.

Las nociones de sistema de prácticas y configuración de objetos y procesos establecidos en Font et al. (2013) permiten abordar los análisis epistemológicos y cognitivos en Didáctica de la Matemática según el marco del EOS. En particular, dan base para formular el problema epistémico (caracterización de los conocimientos institucionales) y cognitivo (conocimientos personales) en los siguientes términos:

¿Cuáles son las prácticas matemáticas institucionales, y las configuraciones de objetos y procesos activadas en dichas prácticas, necesarias para resolver un tipo de tarea matemática? (Significado institucional de referencia).

¿Qué prácticas, objetos y procesos matemáticos pone en juego el estudiante para resolver un tipo de tarea matemática? (Significado personal).

¿Qué prácticas personales, objetos y procesos implicados en las mismas, realizadas por el estudiante son válidas desde la perspectiva institucional? (Competencia, conocimiento, comprensión del objeto por parte del sujeto).

Luego de elaborar esas herramientas para abordar las cuestiones epistémicas y cognitivas, se puede intentar responder cuestiones de diseño instruccional, relativas al proceso pretendido y a las reglas que condicionan su desarrollo. Las mismas tienen un carácter prospectivo (previo a la puesta en marcha), se completan con otras que siguen a la implementación (carácter retrospectivo).

Para proponer cambios fundamentados en un proceso instruccional es necesario explicitar los

principios didácticos que sirven de fundamento, los cuales son introducidos en el EOS mediante la noción de idoneidad didáctica, desarrollada en Godino et al. (2006). Dicha idoneidad se concibe como el criterio global de pertinencia (adecuación al proyecto de enseñanza) de un proceso de instrucción, cuyo principal indicador empírico es el grado de adaptación entre los significados personales logrados por los estudiantes y los significados institucionales pretendidos o implementados. La idoneidad supone la articulación coherente y equilibrada de las siguientes idoneidades parciales: epistémica, ecológica, cognitiva, afectiva, interaccional y mediacional. (Godino et al., 2014, p.171)

Los objetos matemáticos involucrados en la ingeniería didáctica que se pretende en esta investigación, persiguen la enseñanza y aprendizaje de conceptos de la estadística descriptiva que favorezcan el aprendizaje de las ideas fundamentales de la inferencia estadística paramétrica. Estas ideas son definidas y analizadas en Meyer (2005): variabilidad de los datos; población estadística; frecuencias teóricas versus frecuencias empíricas, azar y regularidad estadística; incertidumbre y determinismo en las formas de razonamiento cuantitativas; muestra al azar; y técnicas empíricas vs métodos de la inferencia estadística.

Las mismas surgen de pensar el proceso de transposición didáctica y el análisis del contexto científico, la relación docente-alumno-saber enseñado, de la colección de errores conceptuales estadísticos detectados en diferentes contextos de la instrucción y la interpretación que realiza el colectivo de investigadores y formadores en educación de algunos conceptos estadísticos considerados claves para la formación de razonamientos estadísticos inferenciales, y de una naturaleza e importancia cuali-cuantitativa.

Se destaca en Meyer (2005) la consideración integral del proceso de formación del razonamiento inferencial estadístico inductivo a partir de determinados conceptos de la disciplina asociados a la estadística descriptiva.

Como se mencionó, esta investigación se basa en la visión ampliada de ingeniería didáctica trabajada por Godino et al. (2013). Se tienen en cuenta las dimensiones epistémica, ecológica, cognitiva, afectiva, interaccional y mediacional en las fases de estudio preliminar, diseño, implementación y evaluación en un estudio de caso sobre enseñanza de la estadística descriptiva que favorezca el aprendizaje de las ideas fundamentales de la inferencia estadística paramétrica, en los alumnos de la cátedra de Estadística de la FCE-UNL.

En el Análisis preliminar, se determina la naturaleza de los conceptos de la estadística descriptiva que pueden favorecer el aprendizaje de las ideas fundamentales de la inferencia, desde la perspectiva didáctica, epistemológica y cognitiva con el propósito de identificar hipótesis sobre el proceso de construcción, por parte de los estudiantes, así como aportar elementos para la elaboración de la secuencia de enseñanza.

En la fase de diseño, una vez seleccionada una muestra representativa de situaciones – problemas, se propone de manera sistemática tramar los objetos y procesos que la resolución de tales situaciones pone en juego, a fin de identificar posibles conflictos de aprendizaje y los elementos a tener en cuenta en los procesos de institucionalización y evaluación.

En la fase de implementación, los distintos tipos de configuraciones didácticas, procesos didácticos y la noción de conflicto semiótico interaccional ayudan a identificar hechos didácticos significativos que orienten la evaluación formativa y la optimización del aprendizaje.

En la fase de evaluación o análisis retrospectivo se toma la noción de idoneidad didáctica, con un sistema de indicadores empíricos, que aporta vías para la reflexión sistemática sobre las distintas facetas del proceso de estudio y permite identificar potenciales decisiones que mejoren dicho proceso en una nueva implementación.

IV. COMPETENCIAS Y SECUENCIA DE CONTENIDOS

Comenzaremos planteando los fines principales de la enseñanza de la secuencia. Se espera:

- En general, que los estudiantes lleguen a comprender y valorar el método estadístico, esto es, la clase de preguntas que un uso inteligente de la estadística puede responder, las formas básicas de razonamiento estadístico, su potencia y limitaciones. Puesto que, estamos en presencia de una ciencia que cambia rápidamente, lo más importante no serán los contenidos específicos a desarrollar, sino el tratar de potenciar en el estudiantado una actitud favorable, unas formas de razonamiento y un interés por completar posteriormente su aprendizaje.
- En particular, que los estudiantes aprendan los conceptos de la estadística descriptiva que sustentan las ideas fundamentales de la inferencia estadística paramétrica, para que con el devenir de su formación logren relaciones conceptuales que favorezcan el aprendizaje significativo de ambas ramas.

Las competencias generales perseguidas en la formación del estudiantado son:

- Interpretar, argumentar y proponer soluciones a situaciones, utilizando distintos tipos de pensamientos: lógico, analógico y deliberativo.
- Identificar, plantear y resolver problemas de forma creativa e innovadora, asumiendo la toma de decisiones con responsabilidad ética y profesional.
- A través del trabajo colaborativo se espera que los alumnos, sean competentes a la hora de:
- desarrollar las inteligencias múltiples, interactuando y dando intercambios en debates críticos.
- enseñarse mutuamente con decisión a dominar temáticas y a desarrollar competencias relacionadas con ellas.
- centrar su tarea en practicar estrategias de resolución de problemas y trabajos de indagación.

- utilizar medios orales y visuales para organizar, mostrar y comunicar sus producciones.

La competencia estadística perseguida en la formación del estudiantado es:

Comprender los principios básicos asociados con el uso de la Estadística Descriptiva dentro del entorno profesional.

Los elementos de la competencia son:

- Seleccionar y emplear técnicas especializadas para la presentación de la información estadística.

- Utilizar adecuadamente medidas descriptivas y tipologías de formas de distribuciones, para la caracterización y el análisis de la información estadística.
- Analizar e interpretar salidas de software estadísticos relacionados a los conceptos de la estadística descriptiva.
- Interpretar e integrar los datos estadísticos desarrollando habilidades de comparación.

En la tabla 1 se presentan los distintos componentes asociados con los saberes esenciales de la competencia y de sus elementos. En la primera columna se puede visualizar el orden en que se plantea el desarrollo de los contenidos.

Tabla 1: Saberes esenciales de la competencia estadística perseguida en la secuencia

Saber conocer (SC)	Saber hacer (SH)	Saber ser (SS)
<p>Conceptos básicos:</p> <ul style="list-style-type: none"> • Importancia de la Estadística en el desarrollo profesional. • Variable estadística. • Población estadística y muestra. 	<ul style="list-style-type: none"> • Reconoce la importancia de la Estadística dentro de su campo laboral y dentro de la cultura general del ciudadano. • Reconoce experimentos que generan variables estadísticas. • Identifica los conceptos básicos relacionados con un problema cuya solución requiera de un análisis estadístico. • Identifica los conceptos básicos en distintos tipos de presentación de la información (textual, gráfica o tabular) • Diferencia entre los tipos de variables dentro de una base de datos con información estadística e identifica las poblaciones o muestras bajo estudio. 	<ul style="list-style-type: none"> • Valora el papel de la Estadística en la formación del ciudadano. • Reconoce la importancia de la Estadística como instrumento básico para la producción del conocimiento, en escenarios de incertidumbre. • Valora la necesidad de comprender los conceptos básicos de la Estadística para entender la naturaleza de la disciplina. • Distingue las poblaciones estadísticas que generan los datos.
<p>Presentación de información estadística:</p> <ul style="list-style-type: none"> • Tabular • Gráfica • Distribuciones de frecuencias 	<ul style="list-style-type: none"> • Identifica los problemas relacionados con el proceso de presentación de la información estadística para su análisis y discusión. • Selecciona adecuadamente los gráficos de acuerdo al 	<ul style="list-style-type: none"> • Valora la importancia de utilizar cuadros, tablas o gráficos para resumir y analizar la información estadística de modo que se pueda comunicar un mensaje coherente y simplificado al lector.

	<p>tipo de variable estadística a analizar.</p> <ul style="list-style-type: none"> Identifica los principales elementos que deben incluirse en una tabla, cuadro o gráfica donde se resuma la información estadística. Utiliza el software estadístico para elaborar correctamente cuadros, tablas o gráficos que resumen información estadística. Caracteriza las distribuciones de frecuencias como un caso particular de cuadro estadístico de gran utilidad práctica. Realiza simulaciones de muestreos, utilizando software estadístico, para comparar análisis de muestra en muestra. 	<ul style="list-style-type: none"> Reflexiona sobre las diferencias en el tipo de información que se desea comunicar al lector según el tipo de cuadro, tabla o gráfico que se vaya a utilizar. Comprende las diferencias entre distribuciones de frecuencia muestrales y poblacionales.
<ul style="list-style-type: none"> Medidas de resumen y formas de distribuciones que contribuyen a la información estadística: Medidas de tendencia central (moda, mediana, media aritmética). Medidas de posición (cuartiles, percentiles, etc.). Medidas de variabilidad (rango, varianza, desviación estándar y coeficiente de variación). Medidas de asimetría. Formas de la distribución de frecuencia. • 	<ul style="list-style-type: none"> Identifica la importancia de las medidas de resumen y forma en los procesos de resumen y análisis de la información estadística. Escoge las medidas adecuadas para describir un conjunto de datos estadísticos, en el software estadístico. Interpreta correctamente las medidas de resumen y formas de distribuciones. Reconoce la importancia del concepto de variabilidad para los análisis estadísticos. Compara estadísticamente lotes de datos de provenientes de poblaciones estadísticas diferentes. Realiza y comunica análisis de datos, en contexto, utilizando como base los conceptos estadísticos. 	<ul style="list-style-type: none"> Valora la importancia de las medidas de resumen estadístico dentro de los procesos de análisis de información. Reflexiona sobre el rol de la variabilidad para un análisis estadístico. Comprende las implicancias del muestreo al azar en un análisis estadístico. Logra comprender los alcances de las medidas resumen muestrales en término de conclusiones sobre la población. Logra superar la lógica determinística, pensando estadísticamente en contextos de incertidumbre. Argumenta sobre la validez de un informe estadístico en contexto. Evalúa críticamente la información, no tratando pasivamente las informaciones disponibles y los resultados obtenidos.

Los verbos con que se enuncian los saberes, dan cuenta de la relación con las tareas que caracterizan las tres competencias estadísticas establecidas por DelMas (2002), como son:

- Alfabetización: Identificar, reconocer, interpretar, distinguir, diferenciar, seleccionar, utilizar, caracterizar, realizar, escoger y comparar.
- Razonamiento: argumentar y comunicar.
- Pensamiento: valorar, evaluar, reflexionar y comprender.

V. TRABAJO DE INDAGACIÓN, COMO EJE TRANSVERSAL EN LA SECUENCIA DE ENSEÑANZA

Si bien la secuencia propuesta no se aborda a través de un proyecto, sí su devenir tiende a posibilitar que los estudiantes aborden un problema de indagación y lo trabajen a partir de los pasos generales que se dan en un proyecto. El sistema de prácticas, pretende ser facilitador de dicha tarea.

La producción del trabajo de indagación, es el instrumento para acreditar los saberes comprendidos en la secuencia y no sólo posibilitará desarrollar la capacidad discursiva de los estudiantes y su pensamiento crítico, sino que los hará situar en el análisis de los datos dentro de un argumento coherente y convincente que apoye sus hipótesis, algo relevante a la hora de

desarrollar el razonamiento y pensamiento estadístico en sus futuros contextos profesionales. Será una manera consecutiva, dinámica y alternativa para que los estudiantes desarrollen la competencia estadística esperable en la secuencia.

Gil y Rocha (2010) presentan una reflexión sobre la relevancia y el aprendizaje de la estadística, producto de la utilización de los datos en la vida cotidiana, medios de comunicación, investigaciones, vida laboral, como educadores estadísticos capaces de contribuir en la construcción de las ideas estadísticas y su aplicación en el contexto aporta a la investigación desde las fases para el desarrollo de un proyecto: propuesta, planificación, elaboración y evaluación.

A sabiendas de los tiempos académicos para desarrollar la secuencia, es que se plantea el trabajo a partir de la base de datos de una de las Encuestas Permanente de Hogares del Instituto Nacional de Estadísticas y Censos de la República Argentina (1er trimestre 2021). Esto posibilita a los estudiantes acceder a una base de datos real, que se relaciona con sus futuros contextos profesionales de las Ciencias Económicas y brinda lecturas e interpretaciones de documentación oficial sobre el diseño de registro de la misma al igual que notas metodológicas. Conlleva a un replanteamiento de las fases del desarrollo de un proyecto, como se muestra en la figura 1.

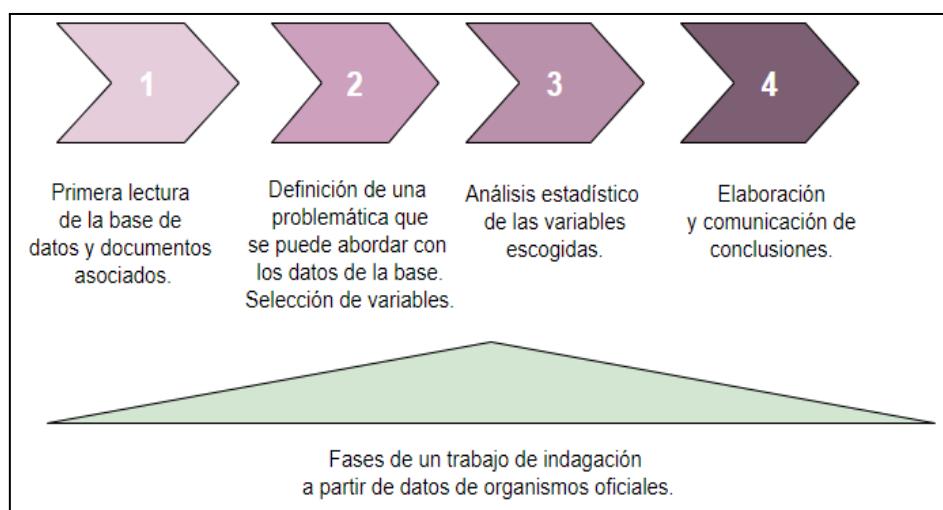


Figura 1: Fases para trabajar proyectos basados en datos de organismos oficiales

Las consignas de cada etapa se pueden ver en las figuras 2, 3 y 4.

https://drive.google.com/file/d/1-bdKvqZIGuq4vu_CsYZlpoV9msoVlnoU/view?usp=sharing

Una posible presentación, en un aula virtual, se puede dar como se muestra en el siguiente video:

Consignas iniciales para el trabajo de indagación y entrega del primer avance

Actividades previas:

- 1- Conformación de los grupos: ingresen al siguiente documento compartido de drive destinado al registro de la conformación de los grupos de trabajo:
<https://docs.google.com/document/d/1DNI3w9w6Yp96s9UmhhdB-vgNjYuWbFD9/edit?usp=sharing&ouid=113791251921245487963&rtpof=true&sd=true>
- 2- Exploren las bases de datos y lean el documento correspondiente a la Encuesta Permanente de Hogares publicados por el INDEC en agosto del 2021.
- 3- Seleccionen 4 variables estadísticas, de las base de datos, que permitan analizar una temática de interés para el grupo (al menos una de las variables deberá ser cuantitativa).

Actividades de entrega:

- 1- Completen el siguiente cuadro, de acuerdo a las cuatro variables de interés escogidas de las bases de datos.

Definición de la variable bajo estudio	Población estadística o muestra, según corresponda	Nivel de escala de medición utilizada	Tipo de variable (cuantitativa o cuantitativa)

- 2- Describan, en un breve párrafo, la temática de interés que tratarán en el trabajo de indagación en relación a las variables escogidas de la base de datos.
- 3- Entregar la base de datos, correspondiente a las variables seleccionadas, en un archivo de Excel.

Los puntos 1 y 2 deben ser entregados en un único archivo de PDF. Tanto el archivo PDF como Excel deben ser nombrados de la siguiente manera: TI_PrimeraEntrega_C@_G@ (reemplazar @ con el número de comisión y número de grupo correspondiente).

Figura 2: Trabajo de Indagación: Primera entrega

Consignas para continuar el trabajo de indagación y entrega del segundo avance

Actividad previa:

Utilizando los softwares Infostat o excel, realicen un análisis estadístico de la base de datos. Para ello, construyan tablas de distribución de frecuencias, gráficos adecuados y calculen las medidas descriptivas que crean de utilidad para cada variable.

Actividad de entrega:

Realicen un informe estadístico, teniendo en cuenta los archivos de lectura que se encuentran debajo de esta tarea, en el entorno virtual.

La presentación debe realizarse en un único archivo PDF, con una extensión menor a 7 páginas (incluyendo gráficos y tablas) y debe ser nombrado de la siguiente manera: TI_SegundaEntrega_C@_G@ (reemplazar @ con el número de comisión y número de grupo correspondiente).

Figura 3: Trabajo de Indagación: Segunda entrega

Consignas para la entrega del trabajo de indagación

Actividad de entrega:

Realizar un video, con una duración no mayor a 5 minutos, donde se presente lo realizado en el informe estadístico destinado al público en general.

El video debe ser subido a la siguiente carpeta de drive: <https://drive.google.com/drive/folders/1S3yhZBBqNVtTEOLFqEyeJr-Z84ffU7k?usp=sharing>

con el nombre: TI_C@_G@ (reemplazar @ con el número de comisión y número de grupo correspondiente).

Figura 4: Trabajo de Indagación: Última entrega

Se espera que, con esta propuesta de trabajo grupal, los estudiantes puedan desarrollar competencias cuyos elementos principales sean no sólo del “saber conocer” y “saber hacer”, sino del “saber ser”; asociadas a los niveles más superiores de la alfabetización estadística correspondiéndose con elementos de conocimiento como ser: del contexto y habilidades críticas.

A su vez se concibe a la enseñanza y el aprendizaje fuertemente retroalimentados por la evaluación, la cual es considerada como una reflexión sobre el proceso de formación. En este sentido, las prácticas evaluativas en las distintas etapas del trabajo de indagación se orientan hacia un único horizonte: que los actores implicados adquieran conocimiento respecto a cómo se está gestando dicho proceso con la finalidad de optimizar la

calidad del mismo. Las rúbricas que se utilizan son de tipo analítica y tienen la finalidad de desglosar los componentes del desempeño observado del grupo de trabajo.

VI. CONSIDERACIONES FINALES

A partir de ya tres implementaciones cuatrimestrales del trabajo de indagación, se han ido forjando mejoras en las consignas y rúbricas. Además se realizaron encuestas a los estudiantes sobre la metodología de trabajo propuesta. Las opiniones han sido en todos los casos positivas, rescatando por ejemplo las siguientes frases:

“Lo mas valioso que me dejó el TI fue volver a aprender a trabajar en equipo y todo lo que eso conlleva después de 2 años de pandemia además de aprender lo inicial de estadística básica de una forma dinámica”.

“Comprender los temas desarrollados y aplicarlos a temas prácticos de interés general”.

“Lo que considero el aporte más valioso que me dejó el haber realizado este “Trabajo de Indagación” fue intercambiar y sobre todo debatir los temas presentados durante el cursado, logrando llegar a conclusiones fructíferas”.

“Poner en práctica contenido de la materia y adquirir conocimientos acerca de la preparación de informes de publicación”.

La identificación de variables, escalas, muestras o poblaciones en la primera fase del trabajo se relaciona directamente con la idea fundamental de la inferencia estadística paramétrica tomada como referencia en el estudio ontosemiótico de lo didáctico, realizado en la investigación, el de: Población Estadística. A sí mismo, el arribar a conclusiones parciales en la etapa final, lleva a los estudiantes a realizar inferencias informales teniendo en cuenta las incidencias de las otras ideas fundamentales.

Creemos que este tipo de trabajo acerca a los estudiantes a la labor del estadístico y lo compromete en la búsqueda de conclusiones aplicables a contexto real y en búsqueda de explicaciones sobre problemáticas sociales.

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The Location of a Tomb of the Pharaoh in Pyramid of Cheops

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ABSTRACT

The subject of this research is the pyramid of Cheops. The goal is to determine the location of the burial place of the pharaoh and his sarcophagus. To achieve this goal, the following methods were used: Theoretical analysis of scientific and research literature on this problem. Summarizing and systematizing practical data.

Processing, synthesis, analysis of the data obtained, building hypotheses and deriving the final result.

Keywords: pyramid of cheops, gallery, pre- chamber, king's chamber, sarcophagus, unloading chamber, ceiling tiles, davison's passage, g. wise's passage, cavigli's climb.

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Место нахождения усыпальницы фараона в пирамиде Хеопса

Alexander Yaroshchuk

ABSTRACT

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Processing, synthesis, analysis of the data obtained, building hypotheses and deriving the final result.

Graphic accompaniment of the version from later prototypes to the author's description of the purpose of the artifact.

The generally accepted version is that the room in the pyramid of Cheops, discovered by the Arabs, is nothing more than the King's Chamber with his sarcophagus. Since then, researchers have been debating whether the upper chamber discovered by Al-Ma'mun is really the King's Chamber, and the object inside it is the sarcophagus of the pharaoh.

The author, summarizing numerous works of Egyptologists, conducts his own research. On its basis, he proves that in the so-called Chamber of the Tsar it is not the sarcophagus, but its defective blank.

Keywords: pyramid of cheops, gallery, pre-chamber, king's chamber, sarcophagus, unloading chamber, ceiling tiles, davison's passage, g. wise's passage, cavigli's climb.

Author: Kemerovo branch of the Union of writers of Russia, Russia, 650000, Kemerovo, Sovetsky PR-t, 40.

АННОТАЦИЯ

Предмет исследования – пирамида Хеопса. Цель – определение места нахождения захоронения фараона и его саркофага. Для достижения поставленной цели использованы следующие методы:

Теоретический анализ научной и исследовательской литературы по указанной проблеме.

Обобщение и систематизация практических данных.

Обработка, синтез, анализ полученных данных, построение гипотез и вывод итогового результата.

Графическое сопровождение версии от поздних прототипов до авторского о назначении артефакта.

Общепринятая версия – открытое арабами помещение в пирамиде Хеопса не что иное как Палата царя с его саркофагом. С тех пор идут споры исследователей, действительно ли открытая Аль-Мамуном верхняя камера – Палата царя, а находящийся внутри неё предмет – саркофаг фараона.

Автор, обобщая многочисленные работы учёных-египтологов, проводит своё исследование. На его основе доказывает, что в так называемой Палате царя не саркофаг, а его бракованная заготовка.

Настоящая усыпальница фараона расположена в другом месте: за северной стеной Разгрузочной камеры над Галереей. Название «Разгрузочная камера» ошибочно. На самом деле – это камера распорных балок (КРБ), служащая защитой от выдавливания

внутрь перегородки смежной камеры, где и находится настоящее захоронение фараона. На это место, как «Большая пустота», указывают и последние данные международного проекта *Scan Pyramids* (Сканирование пирамид).

Позже подобный метод исследования с успехом был применён автором в исследованиях Ломаной пирамиды в Дашуре.

Ключевые слова: пирамида хеопса, галерея, предкамера, палата царя, саркофаг, разгрузочная камера, потолочные плиты, проход дэвисона, проход г. вайза, лаз кавильи.

I. ИСТОРИЧЕСКАЯ СПРАВКА

В пирамиду Хеопса (260 г.) арабы Аль-Мамуна проникли в поисках сокровищ. Они достигли

камеры с плоским потолком и дали ей название «Палата царя». По традиции этот народ так строил потолки усыпальниц для своих вождей. Первооткрыватели помещения не обнаружили там ни мумии фараона, ни сокровищ. Предмет посреди Палаты царя назвали саркофагом фараона.

II. ДОКАЗАТЕЛЬСТВО

Главный элемент, указывающий на усыпальницу фараона (что и является для египтологов важным доказательством) – саркофаг без крышки в Палате царя. Но никакие «доказательства не имеют заранее установленной силы. Оценивается относимость, допустимость, достоверность каждого доказательства в отдельности и взаимная связь в их совокупности» [1].



Rис. 1: Палата царя [2].
Rice. 1: The chamber of the king [2].

В нашем случае саркофаг не может служить доказательством. Насколько он «важный», покажет наше исследование. От внимания аналитиков ускользает значение одной детали – наличие скола угла. Самое уязвимое место подобных изделий – это боковая стенка, а тут угол, хотя он всегда прочнее. Только наличием

скрытой трещины и можно объяснить, что позднее он отвалился во время обработки или транспортировки. В пирамиде Хефrena [3], построенной позже, в усыпальнице стоит тоже саркофаг, но уже защищённый толстым слоем алебастра. Выходит, строители учли негативный предыдущий опыт? Возможно,

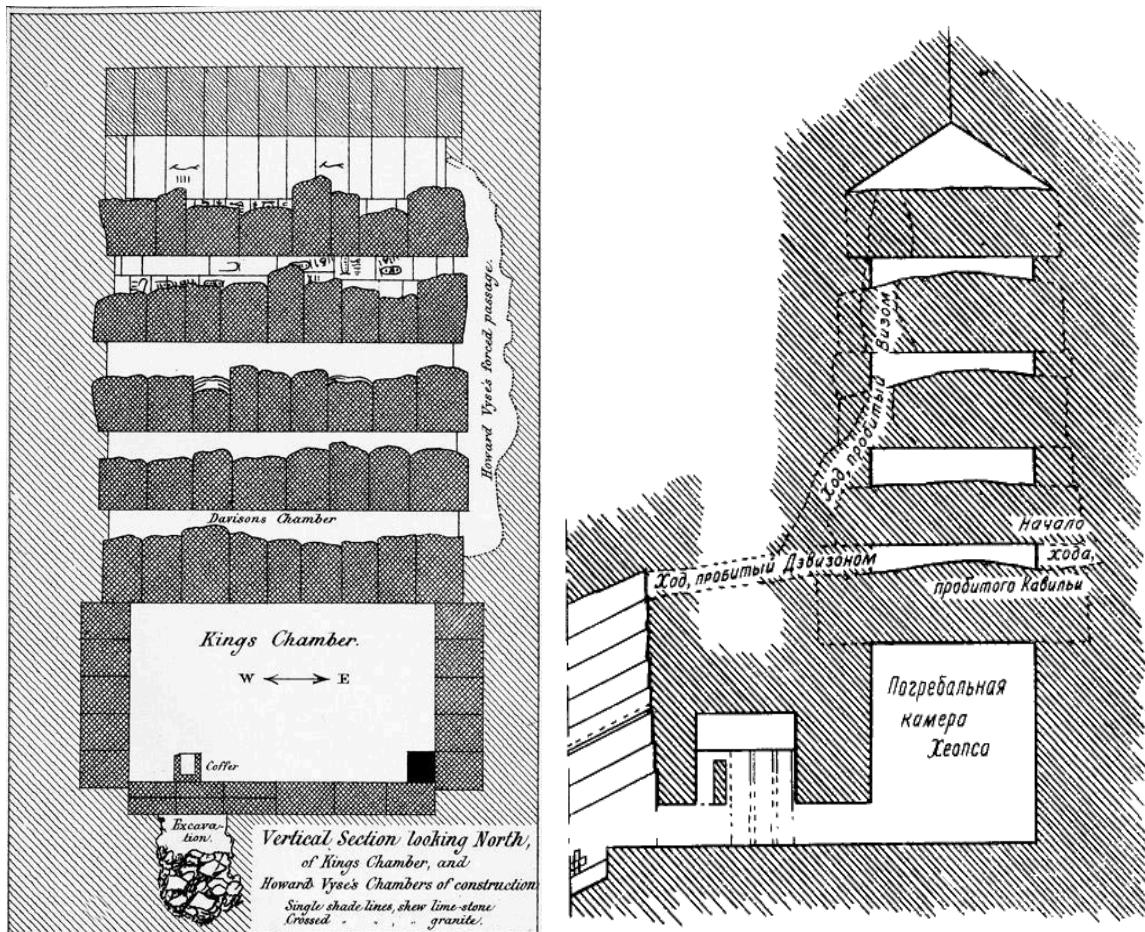
саркофаг Хеопса забраковали и по другой причине. Делающий обмеры саркофага исследователь У. Питри (1837 г.) замечает в своём отчёте [3]: «... он выполнен довольно небрежно». Добавляет при этом, что «...одна боковая сторона была выпилена с помощью пилы огромного размера, которая время от времени застревала, двигалась в обратном направлении и делала вертикальные зазубрины размером в 1 дюйм (2,54 см)». И что? В такой саркофаг уложить царя? А ведь строители идеально отполировали огромную площадь поверхности самой пирамиды, а тут – саркофаг. Ещё один факт. На одной из боковых стенок саркофага, точно по центру, имеется глубокий след от сверла, с помощью которого вырезали углубление для установки металлического стержня, фиксирующего крышку. Фиксация крышечек и других сопрягающихся друг с другом деталей – обычная практика древних строителей. Однако необходимого в данном случае второго углубления на противоположной стороне нет. Это позволяет сделать вывод, что руководитель, поняв, что пилой испортили заготовку, остановил работу. Делают другой саркофаг и к нему подгоняют уже готовую крышку. Вот почему первый саркофаг остался без крышки. А бракованная заготовка так и осталась в камере. Следует повторить истину, проверенную на практике исследования в Египте: никто никогда нигде лишнего и ненужного делать не будет! Тем более из гранита. Как после этого утверждать, что это и есть саркофаг фараона?!

Оценивая сохранившиеся до нас саркофаги, приходим к убеждению, что в Палате царя лишь грубая заготовка. Очевидно, здесь по месту и велись работы по изготовлению саркофага и его художественной отделке. Тем более что саркофаги изготавливались из того же гранита, что и плиты перекрытия Разгрузочной камеры [2, 5]. Этот факт подтверждают найденные под половыми плитами Палаты царя множественные обломки этого материала.

Опираясь на вышесказанное, напрашивается такой вариант: в камеру доставлялись

несколько заготовок на тот случай, если одна из них во время обработки разрушится. А доставить в подсобку ещё один саркофаг в нашем случае, при завершённой-то пирамиде, невозможно. Ну не разбирать же пирамиду!

Важную подсказку, где может располагаться усыпальница фараона, даёт конструкция Разгрузочной камеры.



Rис. 2: Разгрузочная камера. Рисунки выполнены разными авторами [2. 5].

Rice. 2: Unloading the camera. The drawings were made by different authors [2. 5].

В том, что это не Разгрузочная камера, усомнился ещё помощник дилетанта-археолога полковника Г. Вейза инженер-строитель Д. Перинг: «Здесь излишний запас прочности, ибо для этой цели достаточно одной камеры с каменной крышкой» [6]. На левом рисунке видно, что строителей совсем не заботила поперечная нагрузка на плиты. Главная задача видится в укреплении боковых стенок камеры. К такому же выводу приходит и российский исследователь А. Скляров [7]. То же утверждают современные итальянские специалисты. Компиляция с сайта: Cheops. The encyclopedia. Разгрузочная камера [8. 9].

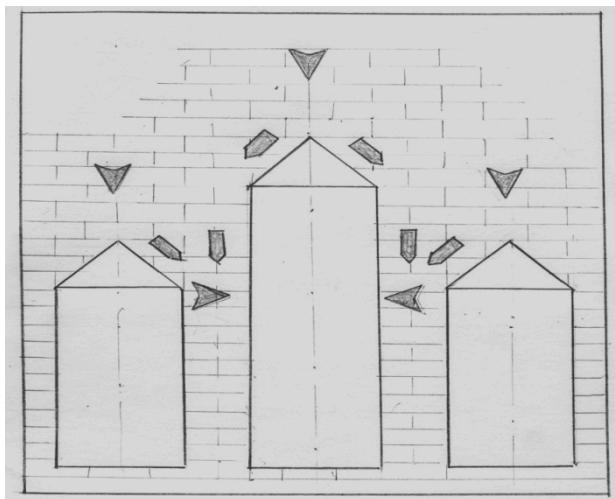
«Самым существенным фактом конструкционных особенностей разгрузочных камер является то, что они не нужны, почти бесполезны для тех целей, для которых их обычно создавали ...».

Анализируя эту компиляцию совокупно с рис. 3, можно прийти к выводу, что это помещение не Разгрузочная камера, а камера распорных балок (далее по тексту КРБ). Распорные балки предохраняют от выдавливания внутрь Разгрузочной камеры её боковые стены. Подобное происходит, когда рядом камера меньшей высоты. Защита боковой стены КРБ будет эффективной в том случае, когда распорные балки упираются в стену южной стороны как в монолит. Поэтому в нашем случае не может существовать «южная камера». Ещё только открыв КРБ, Кавилья, помощник Вайза, в его отсутствие пытался найти «южную камеру» из первой полости КРБ. Однако, пробив лаз длиной более 5 метров и убедившись в бесплодности своей затеи, бросил эту работу [10, 11, 12].

Почему он выбрал это направление? Возможно, Кавилья логично предположил,

что если ось Разгрузочной камеры южнее оси самой пирамиды на целых десять метров, то ось южной камеры будет ещё дальше. Следовательно, нагрузка на её потолок будет

значительно меньше, чем на северное помещение рис 6. Что древние строители и учили. Увы, при поиске тайников логика зачастую не работает.



Rис. 3: Схема гравитационных нагрузок на камеры разной высоты. Рис. Автора

Rice. 3: Scheme of gravitational loads on the chamber of different heights. Rice. Author's

Ещё один важный факт – деформация и наличие сквозных трещин в балках. «Каждая балка с южного конца была в большей или меньшей степени вывернута или искривлена и имела трещины» [12]. И что ещё – ни одна балка не провисла, не смистилась ни на миллиметр в местах раскола! Напоминаю – вес балок не менее 30 тонн [7]! И это, заметим, при общей высоте КРБ 17 метров. Это

возможно только в том случае, когда балки зажаты сильнейшим боковым давлением и когда конец балки жёстко закреплён в южной стене, а другой колебался вместе с тонкой перегородкой между КРБ и камерой с северной стороны во время землетрясения.

По этой причине версия о существовании «южной камеры» необоснованна.



Рис. 4: Снимки в Разгрузочной камере [2. 5].

Rice. 4: Pictures in the Discharge chamber [2. 5].

Где: первый снимок – трещина потолочной балки Палаты царя, 1-й нижней Разгрузочной камеры. Второй снимок – лаз, пробитый Кавильей, ведёт из 1-й Разгрузочной камеры за её южную стену в обход её восточного угла.

Where: the first picture is the crack of the ceiling beam of the Chamber of the king, as it is visible from the 1st lower discharge chamber. The second picture – the manhole punched Kavil, leads from the 1st discharge chamber for its southern wall, bypassing its Eastern corner.

Обратим внимание на стены КРБ. Северная и южная стороны облицованы гранитными плитами поверх известняковых блоков [7, 12]. Восточная и западная стороны без облицовки. Почему такая избирательность? И в чём нужда отделять гранитом помещение, которое никогда и никем не посещалось, а предназначалось только для защиты Палаты царя? Здесь ситуация схожа с отделкой Палаты царицы рис 5. Строители закрыли

плитами каменные блоки, чтобы замаскировать заделанные проёмы входов и выходов в помещении. Существование лаза (вентиляционного проёма) в камере царицы автор предположил в своей книге ещё в 2013 году стр.138 [16]. Этот лаз был открыт египтологами на год позже, в 2014г. Как автор тогда и предполагал, он засыпан песком стр.56 [16]. Сколько таких проёмов в КРБ? Куда и откуда вели? Эту загадку ещё никто не разгадал.

Теперь вспомним историю их открытия. Рабочие, работающие во второй камере, были покрыты до черноты останками насекомых [12]. Это та огромная туча насекомых, которая шлейфом сопровождала похоронную процессию на всём пути от Нила до места упокоения, привлечённая запахом благовоний. Там этот рой и остался замурованным как в усыпальнице фараона, так и в КРБ.



Rис. 5: Вскрытый лаз в Палате царицы. На снимке видим выбирающегося из лаза самого З. Хавааса [2. 5].

Rice. 5: An open hole in the Queen's room. The picture shows from the hatch emerges Z. Havaasu [2. 5].

В своей книге «Operations carried on at the Pyramids of Gizeh» [13] Г. Вейз вспоминает, что «По всему полу был равномерно распределен какой-то черный порошок, на котором четко отпечатывались все следы».

Позднее экспертиза установила, что это останки насекомых. Итальянцы утверждают, этот случай произошёл во втором помещении КРБ [8, 12]. Этот факт указывает на близкое нахождение мумии. Из этого помещения и

следует искать вход в усыпальницу фараона в северном направлении. Можно заранее предсказать, что, попав в усыпальницу фараона, археологи увидят удивительную картину: всё будет покрыто чёрным

покрывалом (порошком). Это прах насекомых, составивших мумии компанию.

Теперь составим план, где находится усыпальница фараона.

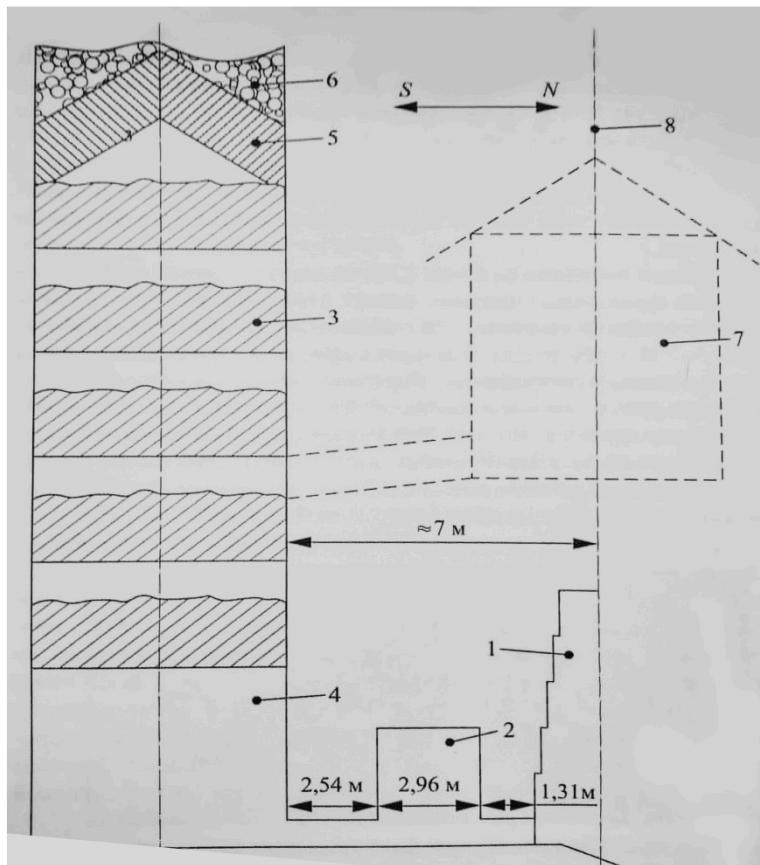


Рис. 6: Условная схема центральной части пирамиды Хеопса с расположением усыпальницы.
Рис. Автора

Rice. 6: Conditional scheme of the Central part of the pyramid of Cheops with the location of the tomb.
Rice. Author's

Где: 1. Южная торцевая стена Галереи; 2. Предкамера. Одна из распорных балок КРБ; 4. Палата царя; 5. Потолочная балка; 6. Забутовка; 7. Предполагаемая зона для усыпальницы фараона; 8. Центральная ось пирамиды.

Where: 1. The South end wall of the Gallery; 2. The pre-chamber; 3. Overlap KRB; 4. The king's chamber; 5. Ceiling beam; 6. Backing; 7. Estimated area for the Pharaoh's tomb; 8. The Central axis of the pyramid.

Что представляет собой помещение для усыпальницы? Если исходить из опыта

перекрытия всех помещений одним размером плит, что в пирамиде Хеопса, что в пирамиде его отца Снефру, то поперечное сечение не должно превышать ширину Палаты царя, то есть не более 5 метров. Длина помещения может составлять от 10 до 50 метров, и зависит от количества предметов, которые предполагал взять с собой фараон в тот мир. Высота, как и Палаты царя, составляет 5 метров. Помещение ориентировано в направлении восток-запад. Вход в усыпальницу должен находиться в восточной стороне в левом углу второй камеры КРБ в северном направлении. Этот вывод вытекает

из вековых традиций египтян делать входы только в углах помещений и только с левой стороны – Палата царя, камеры Ломаной пирамиды Снефру, во всех трёх(!) помещениях Красной пирамиды и в других более поздних. Тем более, что в противоположной стороне Палаты царя уже имеется сквозной проход из Предкамеры и тоже вход с левой стороны [14, 15, 16]. Замечу, по моим сведениям, эта традиция на протяжении тысячелетий ни разу не была нарушена. То есть если снять несколько плит в указанном месте, то обнаружится заделанный проход в усыпальницу царя.

Эту версию автор статьи высказал ещё в 2014 году корреспонденту газеты «Кузбасс» и указал место усыпальницы на схеме пирамиды [17, 18].

Последние исследования подтвердили версию о наличии камеры, которую назвали «Большая пустота», с северной стороны от КРБ над Галереей[19].

Компиляция из материалов В. Лаговского [19]. «В ноябре 2017 г. международная команда ученых Scan Pyramids исследовала египетскую пирамиду Хеопса с помощью

метода мюонной томографии и обнаружила в ней ранее неизвестное помещение «Большая пустота» (Big Void). На его существование указали исследования, которыми руководят француз Мехди Таюби (Hip Institute, Paris) и японец Кунихиро Моришима (University of Nagoya, Japan) в рамках международного проекта Scan Pyramids (Сканирование пирамид). Для анализа использовалось специальное оборудование под названием Geant4. (Geant4 является на сегодняшний день наиболее востребованной программой моделирования прохождения частиц через вещество). С помощью Geant4 ученым удалось смоделировать прохождение космических частиц через материал пирамиды и получить изображение пустот. Добытые научные факты они обнародовали в статье, опубликованной в журнале Nature. Одним из его разработчиков стал научный сотрудник лаборатории экспериментальной физики высоких энергий Томского Государственного Университета Евгений Черняев».

Стоит добавить, что размытость контуров «Большая пустота» (Big Void), объясняется загруженностью помещения предметами обихода фараона.

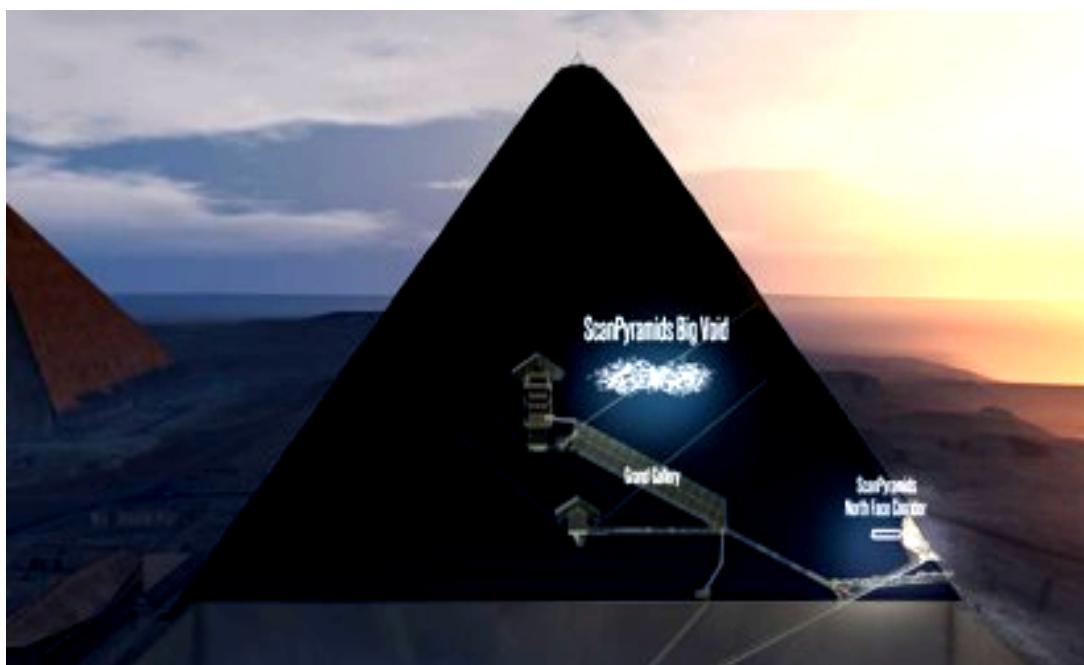


Рис. 8: Изображение Scan Pyramids mission

Rise. 8: Image of Scan Pyramids mission

The Location of a Tomb of the Pharaoh in Pyramid of Cheops

Исследователям удалось установить, что открытая комната находится на северной стороне от КРБ над Галереей, ведущей в камеру фараона. Длина помещения не менее 30 метров, высота около 15 (?) метров. Это первое с XIX века крупное открытие в пирамиде Хеопса, осуществлённое без раскопок. Эта информация дала повод многим «учёным от науки» всласть предаться неуёмным фантазиям. Вот, к примеру, что пишет тот же автор в своей публикации: «В тайном помещении могут быть собраны книги и артефакты, спасенные из погибшей Атлантиды. Могут храниться какие-нибудь инопланетные предметы, доставшиеся от пришельцев, в связях с которыми подозревают древних египтян. Некоторые энтузиасты надеются, что внутри пирамиды спрятана так называемая капсула времени — контейнер с носителями информации, оставленными представителями развитых цивилизаций, которые обитали на Земле ранее».

И это только краткий перечень фантазий подобного рода.

РЕЗЮМЕ

Всё вышеописанное позволяет утверждать, что именно там, с северной стороны КРБ, и находится усыпальница фараона. Вполне возможно, что в недалёком будущем изыскания археологов подтвердят или опровергнут эту версию.

RESUME

Summary All of the above allows us to assert that it is there, on the northern side of the KRB, that the tomb of the pharaoh is located. It is quite possible that in the near future the research of archaeologists will confirm or refute this version.

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Drone – A Tool of Modern Terror

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ABSTRACT

The Unmanned Aerial Vehicle (UAV), commonly known as a drone, has evolved beyond its military and commercial applications, emerging as a potential threat to various facets of modern society. This manuscript explores the prospect of deliberate terrorist use of drone technology, fueled by its low cost and easy accessibility in commercial markets, making it available to a wide range of groups, both state and non-state entities.

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Drone – A Tool of Modern Terror

Władysław Leśnikowski

ABSTRACT

The Unmanned Aerial Vehicle (UAV), commonly known as a drone, has evolved beyond its military and commercial applications, emerging as a potential threat to various facets of modern society. This manuscript explores the prospect of deliberate terrorist use of drone technology, fueled by its low cost and easy accessibility in commercial markets, making it available to a wide range of groups, both state and non-state entities.

Delving into the historical context, terrorism, characterized by the willingness to use violence for individual gain or political power, has persisted throughout human history. The manuscript raises the pertinent question of whether this threat remains imminent. The revolutionary advancements in artificial intelligence (AI) and drone technology present a grave risk to humanity, potentially automating large-scale killing processes. This convergence of technologies offers terrorist groups the capability to acquire and develop deadly autonomous weapons, colloquially referred to as "killer robots." Such weapons could significantly escalate the magnitude of incidents causing mass destruction, particularly in Western countries.

The manuscript draws insights from a case study on the activities of the terrorist organization DAESH, highlighting their grassroots efforts to master drone technology. This home-based initiative reflects a strategic shift, elevating the use of drones in terrorist attacks to a higher level. As the intersection of AI and drone technology evolves, the manuscript underscores the pressing need for comprehensive countermeasures to mitigate the potential threats posed by these advancements.

Keywords: unmanned aerial vehicle, drone technology, terrorism, artificial intelligence, case

study, DAESH autonomous weapons, killer robots, security threats, countermeasures.

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I. INTRODUCTION

The modern world is one "global village", as Herbert Marshall McLuhan said, where changes occur rapidly and information is transferred at a truly light speed from one end of the globe to the other, just like in a small mountain village where everyone knows everything almost in an instant. Rapid globalization and technological progress, combined with asymmetric and terrorist threats, have a profound impact on how we perceive our security and what threats they pose to modern society.

Aviation, like no other technology before its creation and since, is responsible for creating the definition of a "global village". Aviation is the ability to reach any part of the world by air in a previously unimaginable short time. In the past, international travel was the privilege of a wealthy elite or adventurers, while the modern world is available to everyone, for religious pilgrimages, business trips, recreation, but also for groups of terrorists who can use manned and unmanned aviation technology for their nefarious purposes. In short, aviation has changed the way we live, think and what is possible in the world.

¹ Global village - a term introduced in 1962 by Herbert Marshall McLuhan in his book The Gutenberg Galaxy, describing the trend in which mass electronic media are breaking down time and space barriers, enabling people to communicate on a mass scale. [/https://pl.wikipedia.org/wiki/Globalna_wioska](https://pl.wikipedia.org/wiki/Globalna_wioska), [accessed on November 27, 2023]

Aviation and the aviation industry - this is one large area of global security, and also an area of threats. Starting from threats of terrorist attacks, cyber threats and cyberattacks to geopolitical pedestals that tend to be involved in creating threats, including from terrorist groups using aviation, unmanned aviation, i.e. drone technology.

An aviation safety incident is a term given to a safety incident that affects or may affect the safety of the crew, passengers, ground staff or the entire society. Analysts of threats to civil aviation have defined the greatest challenge in the area of its security, namely the changing nature of these threats.

Airlines are threatened by cyberattacks, which may lead to loss of financial revenues, loss of passengers and may cause significant damage to the reputation of a given brand. As a result of cyberattacks, suppliers and external suppliers may also lose business to competitors who have implemented much stronger cybersecurity measures.

One of the main targets of terrorist attacks is also the aviation industry, with its systems that are critical to conducting air operations, where time is a very important factor. Such terrorist attacks could result in massive operational disruptions, large financial losses and potential security risks.

Why would Civil Aviation be a target for attacks by terrorist groups?

Civil Aviation is an extensively interconnected international infrastructure, interconnecting the world and spanning almost every country on earth. Civil Aviation Infrastructure is extraordinarily dependent on computer-telecommunications information systems; i.e. air traffic control, navigation, reservations, aircraft flight control.

Civil Aviation Infrastructure is highly dependent on computer and telecommunications information systems; i.e. air traffic control, navigation, reservations, aircraft flight control, therefore it is an easy and tasty target for terrorist groups to perform cyberattacks.

A possible breakdown of public trust in Civil Aviation security in the event of poor protection against terrorist attacks will have serious global economic and social consequences.

New, innovative technologies change the nature of wars and military operations, and expand the possibilities of activity of entities, both state and non-state, and at the same time they also change the nature of threats and make them dependent, e.g. on cybersecurity.

Modern technology brings with it the so-called democratizing the ability to cause large-scale harm. Historical attacks involved only a few major states, but now they are becoming imaginable to a much wider range of entities and non-state actors.

Democratization of technology² refers to the process by which access to technology rapidly continues to become more accessible to more people.

Thomas Friedman argued that the era of globalization has been characterized by the democratization of technology, democratization of finance, and democratization of information. (Friedman, T.L. (1999). *The Lexus and the Olive Tree: Understanding Globalization*. New York: Random House).

The term "technological democratization" was created included Thomas Friedman and other scholars:

- The Internet, as a key role in modern life and the democratization of knowledge;
- Social Media has strengthened and enabled us to become creators and critics of technological development;
- Generative Artificial Intelligence tools have the potential to democratize the process of innovative improvement of individuals' ability to define and visualize ideas (How Generative AI Can Augment Human Creativity". Harvard Business Review. 2023-06-16. ISSN 0017-8012. Retrieved 2023-06-20);

² https://en.wikipedia.org/w/index.php?title=Democratization_of_technology&oldid=110000000 [accessed on November 27, 2023]

- The Open Source model allows direct participation in software development by contributing opinions (Jesiek, B.K. (October 6, 2003). "Democratizing Software: Open Source, the Hacker Ethic, and Beyond." First Monday, 8(10).)

The functioning of societies simultaneously in cyberspace and in the physical world creates new areas, the so-called vulnerabilities in security systems. The above-mentioned technological democratization has created the ability to wreak large-scale destruction corresponding to the connection of the virtual and real worlds. Activated remote terrorist attacks originating from cyberspace can cause major disruptions in our real world.

Modern systems supporting aviation operations are or could potentially be hacked by terrorist groups. Such potential aviation systems vulnerable to hacker activities, often in the service of terrorist groups, are:

- Reservation systems,
- Departure control systems,
- Air traffic management support systems,
- Access control systems,
- Control systems etc.,
- Carrier data storage systems in the cloud,
- Cargo handling and air operations systems,
- Hazardous materials transport management systems.

In addition to the above-mentioned ground-based aviation infrastructure systems, there are also many on-board and external systems interacting with the aircraft that are vulnerable to terrorist cyberattacks, e.g.

- Flight control systems,
- GPS navigation systems,
- Fuel condition and consumption indicators,
- Computer service, etc.

Cyberterrorism and Civil Aviation are interdependent. Terrorists are able to take control of the air traffic control system to cause a plane to crash or two planes to collide in mid-flight. Terrorist cyberattacks may target areas that are easier to target but could disrupt Civil Aviation

operations on a large scale, such as energy distribution, communication lines, and administrative systems.

Aviation, including unmanned aviation, or individual unmanned aircraft, become targets for terrorists and often have special values, as well as tools to achieve their goals. In the modern world, it does not matter whether it is about nation states or the participation of non-state actors. In modern "conflicts", often called "hybrid war" or "hybrid operations", traditional actors on conventional battlefields do not take part, at least in their initial phases³, and the "conflicts" spread also into civilian domains.

Drones have a significant place and share in this type of activities and are a desirable tool in current and future terrorist activities. Civil aviation is crucial to the functioning of every economy, and any disruption to its functioning as a result of terrorist incidents is intensified by the media, which rapidly disseminate information and disinformation, so it will likely remain a tempting target for attackers, terrorists who are driven by the goal of causing maximum disruption.

Mitigating and eliminating threats to civil aviation security can only be achieved through the concerted effort of aviation security regulators of all states. The flow of critical information exchange between countries on new and innovative methods aimed at Civil Aviation should be increased, and efforts should be made to develop systems that counteract or eliminate the terrorist threat.

The author defined the main problem in the form of a question; *Does the modern world, its globalization and technological democratization enable contemporary terrorist groups to use innovative technology in the form of a combination of AI and drone technology to achieve their terrorist goals?*

³ W. Leśnikowski – *Air power in hybrid operations*, Publishing house Adam Marszałek, Toruń 2019, Poland, p. 115-120.

The research goal of this manuscript is: *To identify historical development, terrorism, threats to society in the process of rapid adaptation to modern conditions, as well as to create comprehensive systems to counter current and future threats resulting from the use of innovative technology by terrorist groups.*

II. TERRORISM AND ITS HISTORICAL PRESENCE IN THE LIFE OF SOCIETY

Terrorism is commonly defined as the unlawful use of violence in order to achieve political and statutory benefits of terrorist organizations. The history of terrorism is as old as humanity and is related to man's willingness to use violence to achieve individual gain or political power. Terrorism has many faces and it is difficult to define it clearly.

The author of this article prefers to adopt the following definition for further analysis. Terrorism is generally considered to be a social phenomenon characteristic of our age and its features result from the international system of nation states. The successes of terrorism are conditioned by the existence of mass media used to create and maintain an aura of terror, uncertainty, terror and fear among large groups of people.

The first acts of organized and documented terror come from antiquity, i.e. the 1st century. The Jewish group Sicaria⁴ was one of the first organized groups of trained assassins to eliminate collaborators and Roman enemies, the rulers from Judea. The liquidation tools were small sicae daggers hidden in their cloaks, and after inflicting fatal blows, they blended unnoticed into the crowd.

⁴ Sicarii (Latin sicarii, Greek σικαριοι, sikarioi, from Latin Sica - short dagger) - a radical faction of zealots. The word means dagger sica and assassins or murderers who committed murders and killings with short daggers. It was a Jewish political party operating from the mid-1st century AD. until the fall of Masada in 73 A.D. They were led by Menachem ben Jair, grandson of Judas of Galilee, who was the leader of the Sicaria until his assassination. (His brother Eleazar replaced him). Their goal was to end Rome's direct rule over the Jews. <https://ichi.pro/sicarii-piersi-asasyni-w-historii-1643..> [accessed 09/12/23]

Another terrorist group was the Hashhashin sect of Islamic assassins, which operated from the 11th to the 13th century in Iran and Syria. The victims of this small ascetic group were Seljumi, prefects, caliphs and crusaders, and the murder itself was a sacramental act for them.

The beginnings of "modern" terrorism date back to 1793, and the word terrorism itself became established during the reign of Maximilien Robespierre after the French Revolution. Robespierre justified his dictatorial, terrorist methods of operation by the need to transform the monarchy into a liberal democracy. The aim of his action was to subdue the enemies of freedom through the use of terror, and thus it is possible to create a better system. The continuator of this type of thought was the 19th century Narodnaya Volya, which wanted to end the tsarist rule in Russia with its terrorist actions.

At that time, the idea of terrorist activities was to counteract the existing public order.

After 1950, the role of non-state terrorism increases rapidly. The so-called guerrilla warfare tactics used by non-state actors. The initiating factors were: activation of ethnic nationalism, e.g. Basque, Zionist, Irish; the rise of anti-colonial movements in French, British and other colonies; the emergence of new ideologies, e.g. communism.

Terrorist groups with nationalistic overtones were created in many places around the world, e.g.; The Irish Republican Army, as well as the Kurds (Kurdistan Workers' Party, PKK) living in Turkey, Iran, Iraq and Syria, and the Liberation Tigers of Sri Lanka from Tamil Eelam adopted terrorist activities as a method of fighting for self-determination.

The years 1970-1990 are an image and period of international terrorism

The late 1960s was a time of preference for international terrorism and the use of kidnapping as a primary tactic. The Popular Front for the Liberation of Palestine is kidnapping in 1968, the El Al flight. Twenty years later, a catastrophic Pan Am flight over Lockerbie, Scotland occurs,

shocking the world. This period in the history of aviation is a time of theatrical acts, acts of violence with the participation of organized terrorist groups with political motives. An example of this type of activities are the events in 1972 during the Olympic Games in Munich. The Palestinian terrorist group Black September kidnapped and then killed the Israeli athletes who participated in those games. The end goal of these actions was to negotiate the release of Palestinian prisoners by using spectacular tactics to draw the attention of the international community to their cause.

The events in Munich had a radical impact on the United States' conduct in the area of terrorism, with counterterrorism specialist Timothy Naftali stating, "The terms counterterrorism and international terrorism have formally entered the Washington political lexicon".

Terrorist actions and violence were justified by the leaders of terrorist groups with a deep belief in the necessity and justice of their causes. The activities of the terrorist group were largely based on the black market and the production of Soviet light weapons, e.g. AK-47 assault rifles, which were mass-produced after the collapse of the Soviet Union in 1989.

Religious terrorism is a sign of the 21st century

The present age is troubled by religious terrorist threats. Islamist groups, e.g. Al-Qaeda, Hamas, Hezbollah, play an important role in this area. Not only do Islamist groups occupy a prominent place on this scene, but other religions such as Christianity, Hinduism, and Judaism also have their own forms of militant extremism.

Karen Armstrong, who is a religious scholar, argues that today's religious extremists have long since moved away from any true religious commandments and have become violent extremists, manipulating religious concepts for their own purposes.

As of 2002, according to the Institute for Economics & Peace, the largest percentage of global terrorist activities are conducted by four main jihadist groups - the Taliban, the Khorasan

chapter of the Islamic State, ISIL, Boko Haram. The mentioned groups committed approximately 9,000 murders in 2018. 87% of all fatalities are the result of the activities of terrorist groups in the following countries; Afghanistan, Nigeria, Iraq, Pakistan, Syria, Somalia, Yemen, India, the Philippines and the Democratic Republic of the Congo.

III. TERROR AND ITS SHADES

Terrorism as a phenomenon is a very difficult term to define. This phenomenon is multi-faceted and cannot be defined in a clear approach or conceptual definition because it depends on a different point of view. The term "terrorism" has its roots in Greek and originally meant "to tremble, to be afraid" or "a terrible word, terrible news", but it also touches on the Latin verb *terro* - "to cause terror, to frighten⁵".

Generally speaking, terrorism can be defined as causing fear, terror, a sense of uncertainty, lack of security, as well as the entire spectrum of rape and violence.

According to experts on the subject, the objects of terrorist activities are largely people who do not have a direct influence on the achievement of the goals that terrorists or entire terrorist organizations want to achieve. Terrorist activities are aimed at achieving effective psychological effects and a large social and media effect.

Common definitions of terrorism are too general and do not allow us to authoritatively determine what is and what is not terrorism, as well as who can be called a terrorist. The analysis of a large number of existing definitions allows the author to conclude that they are insufficient to capture this extremely complex phenomenon - terrorism.

The lack of a uniform and generally accepted definition of terrorism creates serious difficulties in the legal area in the process of international institutional cooperation in the field of combating terrorism and imprisoning the authors of terrorist acts.

⁵ Dictionary of the Polish language 1979, p. 239 <https://sjp.pl/terrorizm>, [accessed 29/12/2023]

IV. CHARACTERISTICS AND CLASSIFICATION OF THE CONCEPT OF TERRORISM

Experts on the subject state that there are currently over two hundred definitions of terrorism. Common elements include concepts regarding the genesis, use of violence, force or the threat of its use, the process of planning actions, as well as the assumed goals to be achieved, political goals, creating an atmosphere of threat and fear, including mass media in these activities to publicize the activities, and also the unpredictability and unpredictability of the perpetrators' actions.

In Polish literature, there are views that terror means rape, violence of strong individuals against weaker ones, that terrorism means rape and violence of weaker people against stronger individuals. In the literature on the subject, you can come across the terms "terror" and "terrorism", which are often confused and this creates huge problems in ultimately defining this phenomenon.

The phenomenon of terrorism is associated with various forms that depend on the place and time of its occurrence. Many phenomena are defined as terrorist acts, which ultimately makes it difficult to definitively define the phenomenon of terrorism legally.

As a result of terrorist activities, the victims may be politicians, policemen, military personnel, but also ordinary people, regardless of age, gender or education. This is the position presented by Szafrański⁶. When attempting to define the phenomenon of terrorism, the problem of the nature of a given state or organization as a "terrorist" arises, because when one begins to take into account the issue of sources of weapons or other means of warfare of various types of organizations, official and unofficial, or terrorist groups. The problem in defining and assigning

⁶ Szafrański J, *Contemporary threats of terrorism and methods of anti-terrorist activities*, Szczecin 2007, p. 18. Publishing house WSGE, University of Economics Euroregional them. Alcide De Gasperi, Special Units of Polish Police Szczecin, Poland, book chapter (305-324)

what is terrorism and what is not lies in the strong connections of this area with politics. Experts on the subject face a dilemma: whether an act of armed attack on politicians or police officers can be justified in some circumstances and whether it can be considered state terrorism? The answer to this issue depends to a large extent on the moral or political beliefs of citizens and is shaped to a large extent by the mass media.

Marian Flemming⁷ also attempted to define the concept of terrorism, believing that "terrorism is intentional actions that constitute a violation of criminal law and are intended, through acts of violence or the threat of such acts, to intimidate state authorities or significant segments of society and to force a specific course of action".

When considering the term "terrorism", one must bear in mind its many types. According to experts on the subject, terrorism is also a specific tactic of perpetrators that can take various forms, e.g.; offensive, defensive and repressive. According to many opinions of experts on the subject in the area of terrorism one can distinguish:

- *State terrorism* - these are the actions of the state and state authorities in relation to their citizens, using various forms of involvement in activities of a terrorist nature with the involvement and financing of terrorist groups.
- *Anti-state terrorism* - actions used by movements, groups or individual persons aimed at destabilizing state structures and social order.

In order to fully define this phenomenon, the motivation criterion should be used:

- *Political terrorism* - this is the action of terrorists aimed at creating an atmosphere of intimidation with a political, possibly religious or ideological background. In the area of political terrorism one can distinguish;
- *Repressive terrorism* - these are the actions of the state and its repressive apparatus, often represented by the police, to restrain and subdue society, groups or individuals,

⁷ Flemming M. (1996), *Political terrorism in international legislation*, Military Law Review No. 1

- *Sub-revolutionary terrorism* - this is an ideologically motivated action, often of small groups or individuals practicing violence for various purposes, such as intimidation, revenge, punishment, but not able to introduce fundamental changes,
- *Revolutionary terrorism* - its main goal is to carry out a revolution and introduce fundamental changes in the structure of the state.
- *Non-political terrorism* – this is an action that is not related in any way with politics or state power in terms of motivation for action, but can be distinguished:
- *Criminal terrorism* - including acts of common crime using methods of action aimed at profit,
- *Pathological terrorism* – these are terrorist activities of people with psychological and mental disorders that cannot be clearly classified, but are or may be the result of frustration, hatred towards the community, specific people or institutions.

In Polish national literature on the subject, you can also find many other classifications, e.g⁸:

- *Individual terrorism* - violence directed against the lives of specially selected individuals or marked groups,
- *Economic terrorism* - actions detrimental to economic relations, economic relations, property rights of owners of factories, enterprises, etc.,
- *Repressive terrorism* - activities carried out by the dominant group in a given community in order to protect threatened privileges,
- *Insurgent terrorism* - actions of an ethno-separatist-nationalist nature,
- *Social-revolutionary terrorism* - these are activities aimed at changing the political system.

In addition to the above-mentioned types of terrorism, some experts in this field classify terrorism according to the tactics of the perpetrators: *regressive terrorism, defensive*

⁸ Pawłowski A. (1991), Typology of political terrorism, [in:] Political terrorism, (ed.) Muszyński J., PWN, Warsaw, p. 94

terrorism and offensive terrorism. This area also includes: direct terrorism, propaganda terrorism, domestic terrorism and international terrorism.

To sum up, terrorism, although a phenomenon known for centuries, is still a unique phenomenon, something difficult to understand, a complex, extremely dynamic problem, which makes research on it very difficult. This also confirms the problem with the adoption of a single, universal definition of terrorism by the United Nations, which still does not exist, which seriously hampers the effective fight against it.

V. THE BIGGEST EXPLORERS OF DRONE TECHNOLOGY IN THE WORLD OF TERRORISM - TERRORIST GROUPS, ARTIFICIAL INTELLIGENCE AND KILLER DRONES (DAESH CASE STUDY)

The modern world, the world of the 21st century, is increasingly subject to digitization, automation and globalization of life. In this world, there are also groups or entire organizations whose goal is to achieve their assumptions and status goals through terror, terrorist activities, through the use of innovative tools in the form of mines, drones and artificial intelligence.

The quasi-Islamic State of Iraq and the Levant (ISIL) launched a successful drone attack for the first time in 2016. As a result of this drone attack, two Peshmerga fighters were killed in northern Iraq. This successful attack resulted in more and more sophisticated technologies being used against their enemies, resulting in imitations around the world. Successes in the use of innovative technology, including drones and artificial intelligence (AI), pushed ISIL to create a "Mujahideen unmanned aerial vehicle" unit that operated in the field of drone development and use in combat as well as in weapons of drone technology.

The use of artificial intelligence (AI) as a weapon may prove to be a serious threat to humanity, it may allow adversaries, including non-state actors, to automate the killing process on a massive scale. The combination of knowledge and experience from drone technology and more sophisticated

to automate the killing process on a massive scale. The combination of knowledge and experience from drone technology and more sophisticated artificial intelligence may provide terrorist groups with the ability to acquire or develop deadly autonomous weapons or "killer robots", which would dramatically increase their ability to create incidents of mass destruction of cities in Western countries.

It is August 4, 2018, at 5:41 p.m. local time, in the capital of Venezuela, Caracas, a celebration of the 81st anniversary of the creation of the National Guard takes place, during which the president of this country, Nicolás Maduro, addresses the gathered crowd. At some point, the sound suddenly stops and the wife, Cilia Flores, standing nearby, and the presidential entourage raise their heads, looking for something overhead. Two drones DJI M600s equipped with a kilogram of C4 explosive were intended to kill the Venezuelan president, but both were shot down by honor guard snipers before reaching their target. As a result of the explosions, one of which took place near the presidential platform, seven soldiers were injured.

"It didn't work today, but it's a matter of time," wrote a group identifying itself as "Flannel Soldiers," as "patriotic soldiers and civilians." The president of Venezuela accused the leader of Colombia, Juan Manuel Santos, and the United States was said to have financed this act of terror. It was probably the first such attack in the world. This attack ushered in a new and sinister era - unmanned aerial vehicle terrorism.

The ability of drones to avoid obstacles and reach places generally considered inaccessible or with very difficult access is clearly illustrated by the situation related to the German campaign in Dresden, during which they spoke; German Chancellor Angela Merkel and Defense Minister Thomas de Maiziere. During Merkel and the Minister of Defense's speech, a UAV Parrot quadcopter appeared on stage. Merkel was amused by the situation, but the security staff were not amused. The situation was very dangerous, because if it had been a terrorist attack, it would have ended tragically. Fortunately, the drone operator's intention was to draw attention to the topic of drone observations.



Source: Enlarge / German Chancellor Angela Merkel smiles as a Parrot AR drone comes in for a crash landing during a Christian Democratic Party campaign event September 15., SEAN GALLAGHER - 9/18/2013, arsTECHNICA.

Photo 1: UAV hovering near Chancellor Merkel

Drone – A Tool of Modern Terror

This situation proves that drone technology is able to provide terrorists with a very good platform for observing targets and carrying out terrorist attacks.

Drones have proven to be a very useful surveillance tool for many governments, and there is no reason to believe that terrorists could not use similar solutions in their terrorist activities. An example of surveillance was a US security conference in 2011, during which one of the speakers demonstrated "a drone that flew silently and identified and tracked people as targets using signals from their cell phones" (Hurby, 2012). These demonstrations of some of the many capabilities of drone technology show that once in the hands of terrorists, it poses a huge threat to high-risk targets such as political figures, business representatives, sports entertainment professionals and other citizens of our society.

The use of armed unmanned aerial vehicles by individuals or small groups who often identify themselves as proxies for nation states is no longer just a future concern, but is largely becoming a present. New, innovative technologies available to all have effectively dispersed the power previously presented by states to the lowest levels.

Current entry barriers are no longer a problem to gain access to the latest technology, the so-called off-the-shelf technology (available straight from the shelf), and which can ultimately be used by deadly units.

Lone actors or small cells of terrorists, criminals and rebels can effectively use the tactical flexibility of a small unmanned aerial vehicle in order to create an atmosphere of panic, wreak havoc, or even use such an unmanned aircraft to shoot down a manned aircraft.

Such situations are no longer just a scenario for science fiction movies, it is already happening, for example with Hezbollah or Hutu rebels, who used drones in their terrorist attacks to ram Saudi air defenses in Yemen. Certain terrorist groups have mastered drone technology without the help of state sponsors. During hostilities, in the civil war in Syria, the so-called The Islamic State has been

very successful in using unmanned aerial vehicles to conduct surveillance and reconnaissance, as well as to conduct offensive operations such as dropping grenades or other explosives on enemy military bases.

Currently, many countries, and most recently Nigeria, Pakistan, Turkey - use armed drones in combat, due to such a situation falling into the wrong hands, the sophistication of such technology as drone technology is growing exponentially.

The modern world is a global village, everything is at your fingertips and by using, for example, the Internet, you can acquire appropriate knowledge and skills to use unmanned aerial systems to carry out terrorist attacks. Unmanned aerial systems are publicly available, and commercial, off-the-shelf technology is relatively easy to obtain. A terrorist group acquiring a drone is not a problem. It can be stolen, purchased from a dishonest state, or from corrupt military officials or intelligence units.

The fact that drones used in a terrorist attack reached a world leader at a public outdoor event in Caracas, Venezuela is testimony to how easily drones can be exploited, and how difficult it is to defend against them.

Drone technology is developing very dynamically and is widely available and is relatively easy to use. Drones are being miniaturized and drones are being created using nano technology. Drones are small, light and relatively easy to maneuver with just a little practice.

Technological development has brought machine learning and artificial intelligence to the modern world, and drones may soon become programmable and intelligent enough that their services can be used without human guidance and for increasingly nefarious purposes.

One of the more nightmare scenarios for society is the possibility of using a drone to deliver chemical or biological agents in a terrorist attack. Intelligence services have long been reporting that Al-Qaeda and other terrorist groups are trying to design a spectacular attack on Western civilization

using weapons of mass destruction. The possibility of using drones to spread deadly viruses and germs, e.g. in stadiums or other places of mass gathering, is a hellishly terrifying prospect of using drone technology. In addition to the physical effects of such a possible bioterrorist attack, it carries the possibility of perpetuating the psychological dimension of terrorism.

VI. INNOVATIVE TERRORISM – DAESH'S STRATEGY FOR USING DRONE TECHNOLOGY

What is *Innovative Terrorism*? Experts on the topic of contemporary terrorism are trying to find an adequate definition of this phenomenon. This phenomenon is defined as the introduction of a new method or the development of an existing technology by a terrorist group or groups.

When analyzing the phenomenon of changing terrorism, it is necessary to analyze its changing features and principles that current terrorist organizations have. This analysis should also take into account the nature and patterns of contemporary terrorism and the resources held by terrorist groups, e.g. DAESH, which is currently defined as the most dangerous organization threatening security and stability, both regional and international.

DAESH and its principles of warfare and methods of terror are based on a radical messianic discourse¹⁰, and it has a powerful influence on activities that threaten the security of the entire world.

The mentioned DAESH and other terrorist organizations use the entire spectrum of

¹⁰ Messianism - a term for hope that first appeared in the religion of Israel, relating to the end of the world ("this age"). Its content is the coming Messianic era, which will be characterized by political freedom, moral perfection and earthly happiness for the people of Israel in their own land, as well as for all humanity. It is closely related to the expectation of the appearance of the Messiah who will save the world. The idea of messianism is present in the teaching of the Hebrew Bible and the Talmud. Messianism then became the main idea of Christianity, the very name of which means messianism (from Greek Christos - Messiah). <https://pl.wikipedia.org/w/index.php?title=Messianism&oldid=11121311> [accessed on December 17, 2023]

opportunities offered by innovative technologies, including drone technology, globalization and the entire Western liberal world of markets. Such a global situation gives a strong terrorist message and radically increases the already large opportunities of terrorists. Terrorists from DAESH and similar terrorist organizations are involved in the process of innovative terrorism by using modern technologies and thus diversifying new types of threats. As mentioned earlier, one of the most dangerous and major threats is drone technology - unmanned aerial platforms.

Information from DAESH combat operations in Syria and Iraq makes us realize how serious a threat this terrorist group's use of drones is to the security forces, but also to civilian society.

When we talk about innovation, we mean, at the state level, the development of new military technologies, tactics or strategies used, or civilian technologies on which breakthrough changes are based. Experts on innovation in the military often call this process "adaptation", importing methods or new materials through the process of imitation, emulation¹¹. It is right to point out that the technologies used by terrorist organizations or individual teams will never be state-of-the-art, but the appropriate term will be *adaptation* or *emulation*¹².

The term innovation in the context of the use of terror refers to the dissemination of the use of new technologies or techniques within terrorist groups, and it consists in the so-called *lesson learned*, i.e¹³. drawing conclusions from previous

¹¹ Emulation – programmatic simulation of the operation of a specific software or hardware platform by another system or on another type of hardware. This process is performed using a special program called an emulator. <https://pl.wikipedia.org/w/index.php?title=Emulation&oldid=11121311> [accessed 17/12/2023]

¹² Dolnik A., Understanding Terrorist Innovation: Technology, Tactics and Global Trends, (Routledge, New York: 2007), pp. 4-21.

¹³ Maria J. Rasmussen and Mohammed M. Hafez, Terrorist Innovations in Weapons of Mass Effect: Preconditions, Causes and Predictive Indicators, (Defense Threat Reduction Agency Advanced Systems and Concepts Office Report, October 2010), Report No: ASCO 2010-019, pp. 2-10. Bleda Kurtdarcan and Barn Kayaoglu, "Turkey Is on the Front Lines against ISIS's Bomber Drones," The National Interest, October 16, 2016.

terrorist attacks and introducing improvements and adaptations to planning and the execution of future terrorist attacks. To sum up, the name of innovative terrorism for terrorist organizations is the introduction of new methods of terror or the development of existing ones. Of course, large terrorist organizations with large financial resources can do this more easily and faster.

In such conditions, DAESH becomes a global threat by using all military tactics and by not respecting any norms or international humanitarian law and other legal principles. Modernized weapons or those developed by terrorist organizations, e.g. DAESH, significantly change the nature of the threat. Drone technology and its application to terror reveals the dangerous face of terror. DAESH developed its own program using home-made, commercial drone technology. In this way, this organization has increased its ability to carry out terrorist attacks using drones.

In 2015, Iraqi Armed Forces and Turkish units deployed in Bashika, northern Iraq, revealed that

DAESH in Ramadi had engaged drones for reconnaissance, spying and intelligence gathering.

The models of fixed-wing drones with explosives on board, refined and modernized by DAESH, are proof of the use of new tactics. In addition to collecting information, drones were modernized, equipped with explosives and prepared for terrorist attacks. Drones have also been used to direct fire from mortars, cannonballs, rockets and to provide electrostatic counter-jamming to cells.

The first use of drones to attack the Turkish military, which was conducting Operation Euphrates Shield by DAESH, took place on September 27, 2016 in Syria. DAESH used a controlled drone to drop explosives on Turkish soldiers. Three Turkish soldiers were injured as a result of this attack. DAESH carried out another attack on October 2, 2016 against Peshmerga forces operating in Iraq as part of Operation Conquest. Fatah in Mosul. The result of this attack was the death of two Peshmergats and two French special forces soldiers were seriously injured as a result of an IED explosion.



Image 1: Drones and documents captured in a DAESH drone facility in Mosul, Iraq

At the end of 2016, DAESH intensified attacks on security forces participating in Operation Conquest in Iraq and against the PYD-PKK¹⁴ as part of the Raqqa offensive in Syria¹⁵. A concern on the international security market is the gradual increase in the use of drone technology by terrorist groups as a means of attack¹⁶.

The introduction of drones into DAESH equipment and their involvement in irregular warfare cause serious losses and create a new, international dimension of the problem¹⁷. In fact, Hezbollah, adversaries in Syria, and Hashd al-Shaabi in Iraq have begun using drone technology to carry out terrorist attacks. Houthis attacked a Saudi frigate loaded with bombs using an unmanned naval vehicle in Yemen, killing three soldiers in the attack¹⁸.

VII. DRONES USED BY DAESH IN TERRORIST ACTIVITIES

DAESH used drone technology to fight in the city to identify snipers, who are largely responsible for large personnel losses. The analysis of available literature on the use of commercial drones after their reconstruction for combat purposes shows that both states and non-state entities want to develop this tactic. The author's task is to analyze and demonstrate how non-state forces and groups, including terrorists, operate drones and what level of danger this action takes for the community.

During the examination of materials acquired as part of Operation Conquest from four fronts¹⁹, 10 workshops were identified where drones were produced and modernized on a home-made basis by DAESH in various locations in Mosul. It was revealed that DAESH was preparing to produce drones as weapons, had a systematic drone technology program and established an aviation sector supervision corroding the purchase and development of drones, and also had an airborne operations center to coordinate committed acts of terrorism using drones.

In 2016, DAESH already used 600 different types of drones, as opposed to 20 types known in 1999. DAESH purchased equipped quadcopters in professional Full HD cameras for around \$1,000.

Examination of documents captured during Operation Conquest proved that drones operated by DAESH were modified to carry and drop explosives.

DAESH used two types of drones:

- Fixed-wing drones
- Multi-propeller drones

Photo 2 shows the types of fixed-wing and multi-propeller drones, both of which were often used by DAESH. Such drones have been modernized by the terrorist group for dropping explosives and were equipped with high-quality cameras. As a result, most could fly for a

¹⁴ Kurdistan Workers' Party (Kurdish: Partiya Karkerên Kurdistanê, PKK), in 2002–2003 as KADEK, and in 2003–2005 as KONGRA-GEL - a political party and separatist movement of Turkish Kurds. The Democratic Union Party (Kurdish: Partiya Yekîtiya Demokrat (PYD) is a Kurdish left-wing political party founded on September 20, 2003 in northern Syria. It is a founding member of the National Body for the Coordination of Democratic Change and is described by the Carnegie Middle East Center as "one of the most important Kurdish opposition parties in Syria". It is the leading political party among Syrian Kurds. PYD was founded as the Syrian branch of the Kurdistan Workers' Party (PKK) in 2003 and the two organizations are still closely linked through the Kurdistan Community Union (KCK). <https://en.wikipedia.org/wiki/De...> [accessed 18/12/2023]

¹⁵ IED (Improvised explosive device) An improvised explosive device is a bomb constructed and deployed in a different way than in conventional military operations. It can be constructed from conventional military explosives, such as an artillery shell, attached to a detonating mechanism. <https://www.britannica.com/improv...> [accessed 17/12/2023]

¹⁶ Christopher Diamond, "DoD Prepares for More Advanced Armed Drones Amid ISIS Threat," C4ISR, March 30, 2017, <http://www.c4isrnet.com/articles/dod-prepares-for-more-advanced-armed-drones-amid-isis-threat...> [accessed 18/12/2023]

¹⁷ Pomerleau Mark, "Counter-Drone is the New Counter-IED", C4ISR, March 21, 2017, <http://www.c4isrnet.com/articles/counter-drone-is-the-new-counter-ied...> [accessed 18/12/2023]

¹⁸ Rifat Süleyman, "منباء الجديدة فرقاطة سعدية تتعرض لجحوم من قبل زوارق بقودها انتحاريون غرب", RT Arabic, January 30, 2017.

¹⁹ "،" قوات المشاركة و محاور عملية الموصل العسكرية، Sky News Arabia, October 17, 2016.

maximum of about 20 minutes, with flight time reduced by the weight of the drone. These types of

drones have become more dangerous to the public and security forces.



Image 2: Drones captured by the ISF

Fixed-wing drone

DAESH purchased Skywalkder XB and Skyhunter fixed-wing drones, which were used for surveillance, reconnaissance and intelligence gathering, as well as for dropping explosives. By using the Video Downlink system, the drone operator could control the situation on the ground from a safe location and target targets.

Image 2 shows DAESH fixed-wing drones that were intercepted by the ISF in Mosul. Analysis of the photo provides information on the intensity of use of this type of drones and demonstrates numerous modifications that increased capabilities such as height, speed and flight range.



Image 3: Fixed-wing munition-loaded drone



Image 4: Fixed-wing drones captured from DAESH

Image 3 shows fixed-wing drones modified by DAESH and ready to drop bombs. The drone is loaded with 40-millimeter ammunition from munition warheads. The drone presented in the photo contributed to the killing of two Peshmerga and injured two French soldiers. Drones of this type are adapted by DAESH to carry IED-type charges inside. Fixed-wing drones were favored by DAESH not only for their ability to carry IEDs, but also for their ability to carry and dropping up to four bombs.

Multi-propeller drone

DAESH prefers commercially available multi-propeller drones to carry out bombing attacks. Drones of this type are readily available on the commercial market and are relatively easy to modify to a strike version. They can even be obtained online and subjected to deep modification. Thanks to the ability of this type of drones to hover, you can very precisely perform a bomb attack on any target.



Image 5: Four-propeller drone captured by the ISF

DAESH's preferred drone model was the DJI Phantom series because it can pursue a selected target and provides live, high-resolution images

streamed up to a distance of 5 kilometers. These drones can stay in the air for 30 minutes, detect obstacles and have the ability to avoid them.



Image 6: Munition-loaded four-propeller drone

The drone presented in Images 5, 6 is equipped with a camera that rotates 1,800 vertically and 3,600 horizontally, as well as mechanisms enabling the dropping of two 40-millimeter ammunition²⁰. A plastic device was attached to the explosive charge and a tail tip to the end of the ammunition so that the charge could move linearly through space and fall to the ground. The simulated combat payload is also equipped with a servo motor for deceleration and was attached to the drone. The operator of such a drone drops

explosive ammunition by opening the lock on which the charge is attached under the drone.

The drone presented in photo 6 is equipped with a camera that rotates 1,800 vertically and 3,600 horizontally, as well as mechanisms enabling the dropping of two 40-millimeter ammunition. A plastic device was attached to the explosive charge and a tail tip to the end of the ammunition so that the charge could move linearly through space and fall to the ground. The simulated combat payload is also equipped with a servo motor for deceleration and was attached to the drone. The operator of such a drone drops explosive ammunition by opening the lock on which the charge is attached under the drone.

²⁰ For details, see the company's official website: Da-Jiang Innovations Science and Technology Co., Ltd, <https://www.dji.com/phantom-4>, (Access date: December 18, 2023).

VIII. THE ADVISABILITY OF USING DRONES IN DAESH GUERRILLA-TERRORIST ACTIVITIES

Mosul and DAESH operations in the area were an ideal theater to use available commercial drones for guerrilla-terrorist operations against the Peshmerga and Iraqi Security Forces (ISF). The use of drone technology allows operators to easily identify and immediately attack a dedicated target. It is important when conducting military operations in an urbanized area, during hand-to-hand combat when targets are nearby. Guerrilla-terrorist operations were carried out by DAESH drone operators from mosques or homes, which made it impossible to distinguish them from civilians.

After an in-depth analysis of available materials regarding DAESH's activities and the use of drones, the author states that drones were used for two purposes:

- Causing as many casualties as possible and
- Presenting propaganda materials in the mass media.

To achieve these goals, DAESH used drones in three ways:

- Reconnaissance and surveillance activities for the purpose of collecting intelligence data,
- Coordinating suicide attacks to maximize casualties,
- Direct attack by dropping IEDs/bombs.



Figure 2: Depicts the instruments, methods and purposes in DAESH's drone

Strategy Reconnaissance/Surveillance

At the beginning of its activity, DAESH used drones to obtain intelligence information



regarding the ISF and Peshmerga, then it modified its tactics and began to perform, in addition to its current activities, also before and during attacks.



Image 7: Screenshot of a DAESH video

The screenshot presented in image 7, 8 comes from a wide-angle video taken by a drone. In the image, green dots mark ISF units and the roads leading to their location (blue dots mark), which were closed by blockades using private cars. In such circumstances, it is impossible for a suicide bomber to reach DAESH. DAESH's only alternative tactic in this situation is to use a drone to reach the target and carry out a terrorist attack on ISF units.

This tactic was used (right part of the photo) by DAESH when stopping an ISF convoy using a drone. A sleeper member of a DAESH cell found itself near a convoy crossing and a DAESH fighter used a drone armed with a combat payload to launch an attack on an ISF tank.

In its subsequent guerrilla-terrorist operations in Mosul, DAESH created a tactic of combining ground operations in the form of a suicide bomber with a payload, or a trap vehicle with an air drone patrol, where the operator was the decision-maker to detonate the explosive charge on the indicated target (see photos 16). It also becomes obvious that if the drone operator decides the timing of the attack rather than the suicide bomber, which has a limited view and is nervous, the death toll increases.

During military operations in eastern Mosul, DAESH carried out over 900 suicide bombings, resulting in approximately 40 percent of the Iraqi Special Forces (Golden Division) being killed²¹.

²¹ Hevidar Ahmed and Rebwar Qasim, "Iraq's Golden Division May Liberate Mosul, but at What Cost?", Rudaw, December 24, 2016.

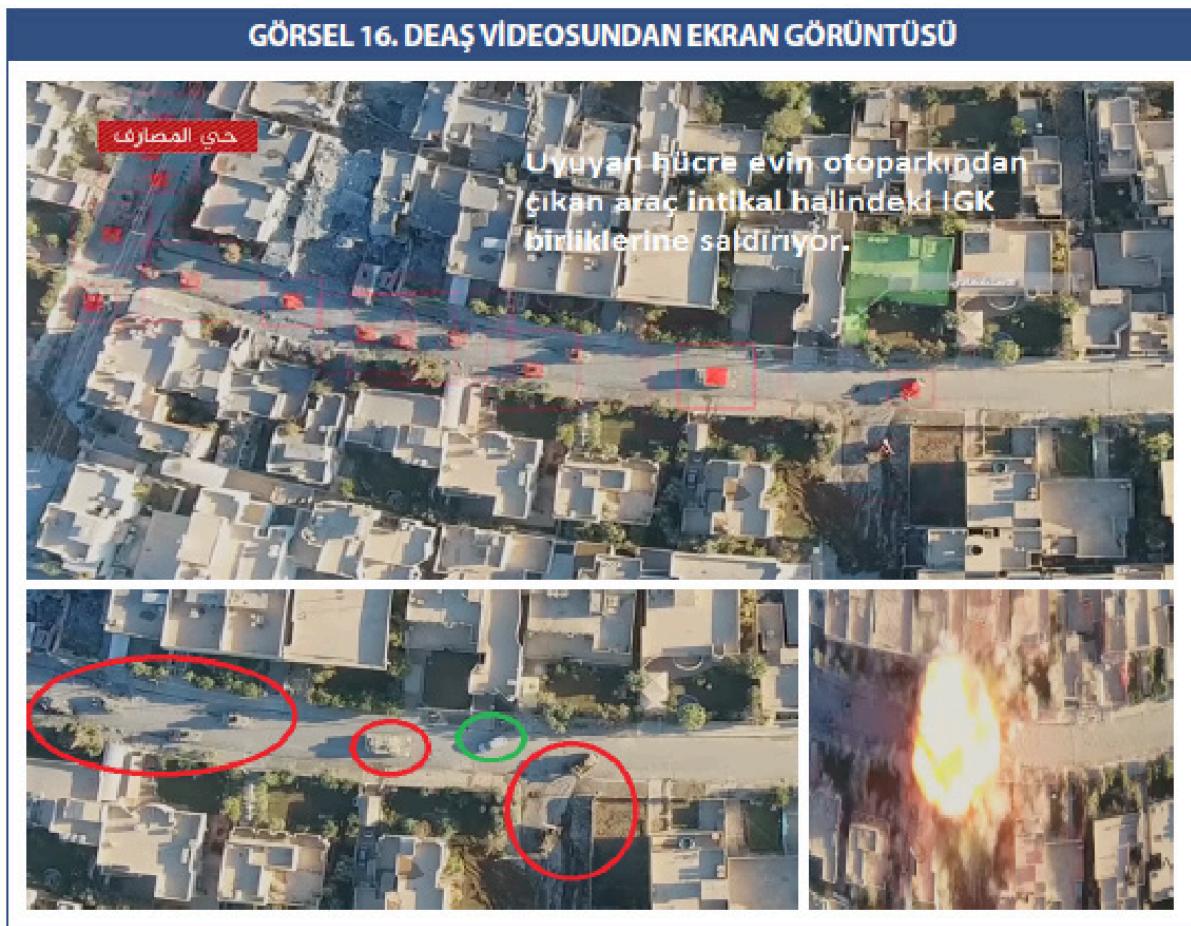


Image 8: Screenshot of a DAESH video

IX. DAESH CASE STUDY SUMMARY

- Diverse Drone Operations: DAESH's use of drones extended beyond reconnaissance and surveillance; they employed drones for air attacks by modifying ammunition and using them to strike designated targets. This highlights the versatility and adaptability of the group in utilizing drone technology for various purposes.
- Strategic Assumptions:** The strategic assumptions of DAESH involved modifying ammunition and placing it on drones to implement air attacks. This indicates a level of planning and innovation in their tactics, showcasing a willingness to adapt and leverage technological advancements for their goals.
- Weaponization of Drones: DAESH not only used drones for reconnaissance but also weaponized them, employing hand grenades, rocket warheads, and light ammunition. The

availability of such ammunition was facilitated by the ongoing military operations in Syria and Iraq, providing a steady supply for the terrorist group.

- Chaos-Inducing Tactics: The tactics employed by DAESH aimed at causing chaos by conducting explosive attacks from drones. This strategy was evident in their use of grenades and other explosives, reflecting a desire to instill fear and disrupt civilian life and security forces.
- Major General Rupert Jones's Assessment:** The British general in charge of the area, Major General Rupert Jones, condemned DAESH's drone operations. He emphasized that the group used drones to drop grenades on civilians and security forces in Mosul, characterizing these attacks as inhumane and indiscriminate. This assessment underscores the severity of the threat posed by DAESH's drone tactics.

- Supply Sources: Obtaining drone loads was facilitated by the ongoing military operations in Syria and Iraq. The conflict zones provided ample opportunities for DAESH to secure the necessary equipment and ammunition for their drone operations.
- Insidious Threat:** Major General Rupert Jones highlighted the insidious nature of the threat posed by commercial drones in the hands of terrorists. As military operations in Iraq progressed, the exploitation of commercial drones by terrorist groups became an increasingly significant and challenging aspect of the security landscape.
- In conclusion, DAESH's drone operations represent a multifaceted and evolving threat, encompassing reconnaissance, surveillance, and weaponized air attacks. The group's tactics aimed at causing chaos through indiscriminate attacks on civilians and security forces, highlighting the urgent need for effective countermeasures against the weaponization of drone technology by terrorist organizations.

DAESH's drone operations did not only focus on conducting reconnaissance, surveillance and attack activities, but also used drones to carry out air attacks. In order to implement these strategic assumptions, DAESH modified ammunition and placed it on a drone to strike designated targets. The attacks used hand grenades, rocket warheads and light ammunition. Obtaining these drone loads was not a big problem, as military operations in Syria and Iraq were good sources of supply.

DAESH's tactics were based on causing chaos by carrying out attacks explosives from drones. The British general commanding the area, Major General Rupert Jones, stated that the militant group used drones to drop grenades on civilians and security forces in Mosul in inhumane and indiscriminate attacks. The general also stated that as the operation neared its end, commercial drones were everything and their exploitation by

terrorists was becoming an increasingly insidious threat in Iraq²².

What will be the role of drones in future terrorist attacks?

The Role of Drones in Future Terrorist Attacks:

Nowadays, a drone is not only a very useful technology in the military or commercial area, but also a kind of threat to many areas of functioning of modern society, including civil aviation.

Experts on the subject are convinced that there are possibilities of deliberate, terrorist use of drone technology not necessarily only in conflict zones, but also outside them.

The development of drone technology and its use by terrorist organizations is not only a current threat, but will also threaten future plans and actions of security forces.

The Role of Drones in Future Terrorist Attacks:

- *Emerging Threat Landscape:* The role of drones in future terrorist attacks is anticipated to expand beyond military and commercial applications, becoming a potential threat to various aspects of modern society, including civil aviation. Recent incidents, such as the one at Gatwick airport, underscore the disruptive potential of unauthorized drone intrusion into critical spaces.
- *Financial Implications:* Incidents involving unauthorized drone activity prompt authorities to invest in anti-drone technology, leading to substantial financial costs. The need to counteract potential threats posed by drones creates a significant burden on the budgets of organizations and institutions vulnerable to such intrusions.
- *Global Conflict Zones:* In conflict zones, terrorist organizations have already utilized drone technology for targeted attacks, posing a threat to national infrastructure. Examples include attacks on leaders and infrastructure in Saudi Arabia and the United States, showcasing the potential global impact of drone-enabled terrorism.

²² Larissa Brown, "British General Issues Warning over Jihadis' Death Threat from Drones after ISIS Use Them to Drop Grenades on Civilians," *Daily Mail*, February 17, 2017.

- *Domestic Threats:* Experts highlight the potential for deliberate terrorist use of drones outside traditional conflict zones. FBI Director Christopher Wray emphasized the direct terrorist threat posed by drone technology in cities and society, underscoring the need for comprehensive security measures.
- *Future Threats:* The development and use of drone technology by terrorist organizations not only represent a current threat but also indicate potential threats to future security plans. The deployment of explosives on drones in crowded places is identified as a significant future threat, surpassing conventional security measures during public events.
- *Technological Advancements:* The development of anti-drone systems is crucial for mitigating the threat posed by unauthorized drone activity. However, current systems are not yet fully effective, and the rapid evolution of drone technology presents an ongoing challenge. The ability of a single operator to manage a fleet of drones, such as a swarm, adds complexity to countering the threat.
- *Future Drone Development:* Future drone development is expected to focus on achieving greater altitude, extended flight range, increased payload capacity, maximum speed, and heavier ammunition loads. These advancements may pose challenges to existing countermeasures and demand continuous innovation in security protocols.
- *Detection and Neutralization Challenges:* Locating and neutralizing drones remain challenging due to factors such as radar cross-section, visibility, and audible signatures. Traditional kinetic methods may be insufficient, necessitating the development of advanced anti-drone systems capable of addressing these challenges.

Nowadays, a drone is not only a very useful technology in the military or commercial area, but also a kind of threat to many areas of functioning of modern society, including civil aviation. The latest example is the incident at Gatwick airport, where drones were observed and classified as an unauthorized or unauthorized intrusion into the

airport's space. The act of this unauthorized intrusion caused great confusion among airport managers, decision-makers and law enforcement agencies. The result of this intrusion was the cancellation of dozens of flights, and thus losses amounting to tens of millions as a result of the closure of the airport area and the airport.

Such incidents force managers to acquire anti-drone technology to counteract these incidents, which in turn generates further large financial costs. In conflict areas, drone technology is used to attack and kill leaders of the opposing side, for example, Hutu rebels killed Yemeni leaders. The victim of such action was broadly understood national infrastructure - Saudi Arabia and the United States. In 2012, a group operating in Virginia, USA and related with the Pakistani terrorist organization called Lashkar-e-Taiba attempted to obtain this type of equipment for other terrorist groups. A student studying at a renowned university was also caught in the United States and was planning to remotely attack government facilities and military installations using drones loaded with explosives. Experts on the subject are convinced that there are possibilities of deliberate, terrorist use of drone technology not necessarily only in conflict zones, but also outside them. In 2017, FBI Director Christopher Wray stated that today, drone technology and drones in the hands of the wrong people pose a direct terrorist threat to our cities and to our society.

The development of drone technology and its use by terrorist organizations is not only a current threat, but will also threaten future plans and actions of security forces. Explosives placed on board a drone and used in crowded places are one of the greatest threats of the future. Explosives placed on a drone will easily defeat conventional security measures during outdoor sports, political or cultural meetings. The panic and terror of the crowd will be much greater than in the case of an explosion of an explosive dropped by a drone.

The threat posed by the use of drones can be reduced through development and use of advanced technology. We are talking about an anti-drone system, but it has not yet been

developed to be one hundred percent effective, and drone technology is developing very quickly. Currently, a single operator is able to manage an entire fleet of drones, e.g. a swarm.

When considering the future of drone development and the possibility of their use by terrorist groups, it should be taken into account that drone technology will develop to achieve better altitude, flight range with the maximum load on board, its maximum speed and the weight of ammunition that can be loaded.

A drone is a difficult object to locate, either by radar due to its cross-section and signature, or to neutralize it kinetically because it is visible to the naked eye from a distance of about 100 meters and audible from a distance of 40 meters. These parameters are not suitable for eliminating the threat posed by drones. Systems are used in two modes to neutralize unwanted drones and drones used by terrorist groups; stationary and mobile.

Such systems will be installed to protect critical places and in urban locations, and mobile phones operating in the systems will protect VIPs against possible assassination attempts. In addition, mobile systems will be implemented in important locations and during meetings on request or in the event of potential terrorist threats. As part of future preventive actions against possible threats of terrorist attacks, the following actions should be taken:

- Construction of systems with permanent location in critical places, such as the buildings of heads of state, parliaments, the most important cultural places of the state, the most important places of the Critical Infrastructure of the state and other important places for the existence of society.
- Building mobile anti-drone protection systems that are easy to install in the transport of VIPs.
- Surveillance of the commercial market for drone technology aimed at preventing acquisition in mass quantities for groups such as DAESH.
- Counteracting unauthorized drone flights over institutions, organizations and places critically important for the national and international

security and military security zones; preventing terrorists from acquiring such aircraft for potential use in bombing attacks and conducting reconnaissance activities of possible locations for carrying out terrorist attacks against the security of the state and institutions and highly sensitive organizations, taking photos and videos of vomiting objects.

- Establishing a law according to which persons purchasing drones weighing 0.54-4 kg (category DRONE055) should be subject to the registration process, as is the case with other categories of drones.

Modern, innovative terrorism will be governed by new methods and will benefit from the development of new or existing technologies. Terrorism is changing its face and resources, its nature and patterns of using innovative terrorism. DAESH was such an example of the innovative use of a new technique, including drone technology, which became the most dangerous organization threatening regional and international stability.

DAESH's radicalism, its methods of terror and its ideology based on a messianic discourse that is assertive enough to influence the masses have made it the most dangerous terrorist organization threatening world peace. Similar organizations use the opportunities provided by modern technology, the globalization of our world, and the literal roars offered by society to increase the impact of terrorist messages and the effectiveness of terrorists. Innovative terrorism is weaponized into new technological platforms and gradually diversifies new types of threats. One such most striking new threat is unmanned aerial vehicles.

In his article, the author analyzed the use of drone technology by terrorist organizations, in the past on the basis of DAESH, as a Case Study, and tried to outline recommendations for the development of modern, innovative terrorism and the use of the latest technical and technological achievements to eliminate this problem and new threats to social security.



Image 9: Roman Durnev, Kirill Kryukov

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Keywords: satisfaction with learning, English for an effective communication course, student learning needs, and course content.

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Student satisfaction is an essential aspect of any successful educational program. This paper examines the level of satisfaction of students in advanced English for an Effective Communication Course offered at Gulf University with the learning experience. Specifically, the paper explores some factors that may contribute to student satisfaction with learning, such as course content, teaching methods, and course instructor. The study was conducted over one academic semester i.e. Spring 2022/2023. Quantitative and qualitative data were collected from 20 students who participated in the course through a survey of students satisfaction with the course. The results indicated that students were highly satisfied with the English for Effective Communication Course and identified course content, teaching methods, and feedback as key factors contributing to their satisfaction. All the survey questions scored an average above 4.50 out of 5.00 on the Gulf University course survey questionnaire and show a high level of satisfaction. The paper concludes with recommendations for educators on how to design and deliver courses that satisfy students' needs.

Keywords: satisfaction with learning, English for an effective communication course, student learning needs, and course content.

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I. INTRODUCTION

Student satisfaction is a critical factor in the success of any educational program. In higher education, student satisfaction is often measured

by various indicators such as retention rates, graduation rates, and student feedback. Student satisfaction with learning refers to the degree to which students feel fulfilled, engaged, and motivated in their educational experiences. It is a significant aspect of education, as satisfied students are more likely to persist in their studies, achieve better academic outcomes, and develop positive attitudes towards learning.

Many factors can contribute to student satisfaction with learning, including the quality of teaching, the relevance and usefulness of the curriculum, the availability of resources and support services, the level of engagement and participation in class, and the overall learning environment.

Numerous studies investigated student satisfaction with learning in various contexts, including primary, secondary, and higher education. For example, Kuh and Hu (2001) found that student satisfaction with the quality of interactions with faculty members, the level of academic challenge, and the overall campus environment were among the most important predictors of student persistence and success.

In addition, a review of research on student satisfaction with online learning by Means et al. (2013) found that factors such as the design and organization of online courses, the quality and frequency of instructor feedback, and the level of interaction and collaboration among students were critical to promoting student satisfaction and engagement.

Overall, student satisfaction with learning is a complex and multifaceted construct that is influenced by a wide range of factors. However, research suggests that by paying attention to the

key aspects of teaching and learning, educators and institutions can create more positive and engaging learning experiences that promote student satisfaction and success.

This paper focuses on the level of satisfaction of university students in an advanced English for Effective Communication course offered at Gulf University. The study aims to identify the factors that may contribute to university student satisfaction with learning and to provide recommendations for educators on how to design and deliver courses that meet the needs of students. Mainly, the study will assess how GU students are satisfied with the learning experience while studying the nominated course.

II. LITERATURE REVIEW

Student satisfaction is a widely studied topic in the field of education. In response to internationalization and globalization, especially in higher education, universities in non-English-speaking countries have implemented English as a medium of instruction (EMI). In their study, Le and Nguyen (2023) evaluated the satisfaction of Vietnamese undergraduate students with regards to different dimensions of EMI courses. Additionally, they explored the correlation between student motivation, engagement, and satisfaction with EMI courses. Their research employed a quantitative approach, utilizing structured questionnaires administered to a sample of 437 students. They conducted a hierarchical regression analysis to investigate the connection between students' motivation, engagement, and satisfaction with EMI courses. The findings unveiled that student generally hold a positive perception of the EMI courses they have undertaken. They expressed the highest satisfaction with teachers' teaching characteristics, while the lowest satisfaction was associated with students' learning characteristics. Moreover, the results affirmed that cognitive and emotional engagement play a mediating role in the relationship between motivation and students' satisfaction with EMI courses.

In 2022, Darawong and Widayati conducted a comparative study between Thai and Indonesian students to examine the impact of four service

quality dimensions on student satisfaction and the learning outcomes of online courses. The study included a sample of 352 Indonesian students and 380 Thai students who were enrolled in bachelor's degree programs and had experience with online course services. The analysis of the data revealed interesting findings. In the case of Thai students, the service quality dimension with the strongest effect on student satisfaction was reliability, followed by responsiveness and competence. On the other hand, for Indonesian students, the service quality dimension with the strongest impact on student satisfaction was empathy, followed by responsiveness, competence, and reliability. This study presents original research conducted in Thailand and Indonesia, providing a comprehensive analysis and interpretation of the findings.

Geologists and engineers recognize the importance of possessing strong technical writing skills. In the undergraduate curriculum, students typically enhance their abilities through repeated practice and feedback. In a study conducted by Walton (2020) focusing on a senior-level engineering geology class, the effectiveness of an iterative practice and feedback model was examined. The study analyzed quantitative data derived from rubric-based self- and peer assessments of draft reports, as well as teaching assistant assessments of final reports. By utilizing regression analysis, trends in technical writing performance were identified. The research revealed that students experienced significant improvements in four specific rubric categories: transparency, completeness, style, and graphics. While the GPA of the reviewers did not prove to be a reliable predictor of peer-review quality, their performance in the assigned writing tasks did. In conclusion, the study demonstrated that the iterative practice and feedback model effectively enhances students' technical writing skills, with the quality of peer reviews given on report drafts playing a significant role in student skill development.

In their study, Wu, Zha, and Mattson (2020) examined the impact of role assignments within team-based learning (TBL) modules on the development of technical writing skills in

undergraduate civil engineering (CE) materials lab courses. The researchers evaluated technical writing skills using a standardized rubric to assess lab reports. Two lab sections were involved in the study, with one section having peer leaders assigned to each team and the other section lacking peer leaders. The researchers compared the scores of lab reports between the two sections. The overall findings indicated that TBL modules can enhance students' technical writing skills and their self-perception of their abilities over the course of a semester. It was observed that the TBL team with an assigned team leader exhibited different working dynamics compared to teams without an assigned team leader, and significant differences were noted in specific group reports.

According to a study conducted by Kuh et al. (2010), student engagement, quality of teaching, and campus environment emerged as crucial factors that influence student satisfaction. Similarly, Braxton et al. (2014) found that student-faculty interaction, academic advising, and course content played significant roles in predicting student satisfaction. In the specific context of technical writing courses, previous research (Hudak et al., 2012) has identified instructor feedback, peer review, and collaborative learning as important elements contributing to student satisfaction.

Based on the literature reviewed, several factors have been identified as influential in students' satisfaction with learning. These factors include:

- Student Engagement: Active involvement and participation in the learning process contribute to higher satisfaction levels.
- Quality of Teaching: Effective teaching practices, including clear communication, engaging instructional methods, and supportive learning environments, positively impact student satisfaction.
- Course Content: Relevant and meaningful course content that aligns with students' interests and goals enhances satisfaction.
- Student-Faculty Interaction: Positive interactions with faculty, such as approachability, availability, and effective

communication, contribute to higher satisfaction levels.

- Academic Advising: Adequate support and guidance from academic advisors help students navigate their educational journey, leading to increased satisfaction.
- Instructional Materials: Well-designed and accessible instructional materials, such as textbooks, online resources, and multimedia tools, play a role in students' satisfaction with learning.
- Assessment Methods: Fair and meaningful assessment methods that provide constructive feedback contribute to student satisfaction.
- Classroom Environment: A positive and inclusive classroom environment that encourages collaboration, respect, and active learning fosters higher levels of satisfaction.
- Instructor Feedback: Timely and constructive feedback from instructors helps students understand their progress and areas for improvement, leading to greater satisfaction.
- Peer Review: Opportunities for peer review and collaboration provide valuable perspectives and feedback, enhancing satisfaction with learning.
- Collaborative Learning: Engaging in collaborative learning activities, such as group projects or team-based learning, can positively impact student satisfaction.

Overall, these factors collectively contribute to students' satisfaction with learning experiences, highlighting the importance of effective teaching practices, supportive environments, and meaningful engagement opportunities.

III. THEORIES BEHIND STUDENTS' SATISFACTION WITH LEARNING

Student satisfaction with learning is a multifaceted concept that is influenced by various factors. Self-Determination Theory (SDT) is one such theory that helps explain the factors contributing to student satisfaction. According to SDT, satisfaction with learning is influenced by three fundamental psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 2000). Autonomy refers to the desire for control over one's learning and the ability to make

choices. Competence pertains to feeling capable and effective in one's learning endeavors, while relatedness encompasses the need for connection with others and a sense of belonging in the learning environment.

Another theory that explains student satisfaction with learning is the Expectancy-Value Theory (EVT), which suggests that students are motivated to learn when they have a positive expectation of success and when they value the content of their learning (Eccles & Wigfield, 2002). According to EVT, students are more likely to be satisfied with their learning when they perceive that their efforts will lead to successful outcomes, and when they find the content of their learning to be relevant and meaningful.

Expectancy-Value Theory (EVT) suggests that students are more likely to be satisfied with their learning when they have a positive expectation of success and when they find the content of their learning to be relevant and meaningful. According to EVT, students are motivated to learn when they believe that their efforts will lead to successful outcomes, and when they value the content of their learning. When students are engaged in meaningful and relevant learning experiences and believe that they can succeed, they are more likely to feel satisfied with their learning.

The Social Cognitive Theory (SCT) emphasizes the impact of social and environmental factors on student satisfaction with learning (Bandura, 1986). According to SCT, students observe and imitate the behaviors and attitudes of others in their learning environment, and they are influenced by the feedback and support they receive. Self-efficacy, which refers to one's belief in their ability to succeed in learning, is also highlighted as a crucial factor in student satisfaction. SCT suggests that student satisfaction with learning is influenced by social and environmental factors, as well as their belief in their own abilities. When students receive positive feedback, support, and have confidence in their abilities, they are more likely to experience higher levels of satisfaction with their learning experiences.

In summary, these theories propose that student satisfaction with learning is shaped by a combination of various factors. These factors encompass psychological needs, motivation, the significance and meaningfulness of the learning material, social and environmental influences, and self-efficacy. Utilizing these theories, educators can create and implement courses that cater to students' needs and aspirations, fostering their motivation and overall satisfaction with the learning process.

IV. HOW TO ASSESS YOUR STUDENTS' SATISFACTION WITH LEARNING

Assessing student satisfaction with learning can provide valuable feedback for educators and institutions to improve the quality of their teaching and learning environments. Here are some methods for assessing student satisfaction with learning, along with relevant citations:

4.1 Surveys

Surveys can be used to gather feedback from students about their satisfaction with various aspects of their learning experiences, such as course content, teaching methods, and support services. Surveys can be conducted online or in person and can be quantitative or qualitative (Shea & Bidjerano, 2010).

4.2 Focus groups

Focus groups can provide in-depth insights into students' experiences and perceptions of their learning environments. A facilitator can lead a group discussion among students to explore their opinions and attitudes about their learning experiences (Krueger & Casey, 2000).

4.3 Interviews

Interviews can be conducted with individual students to gain a more detailed understanding of their experiences and perspectives on their learning. Individual interviews can be more time-consuming than surveys or focus groups, but can provide rich data on students' satisfaction with learning (Seidman, 2013).

4.4 Course evaluations

Course evaluations are commonly used in higher education to gather feedback from students on their satisfaction with a particular course. Course evaluations typically include questions about the quality of teaching, course content, and learning outcomes, and are completed by students at the end of the course (Braskamp & Ory, 1994).

4.5 Learning analytics

Learning analytics involves using data from digital learning environments to assess student performance and engagement. Learning analytics can provide insights into students' satisfaction with learning by analysing data on their participation, performance, and interactions with learning materials (Siemens & Long, 2011).

These methods can be employed individually or in combination to evaluate student satisfaction with learning. By collecting feedback from students, educators, and institutions can pinpoint areas that require improvement and implement changes to better align with their students' needs and expectations.

In the current study, course evaluations exclusively serve as the method for assessing the satisfaction of GU students with the content covered in the English for Effective Communication Course taught during the spring semester of the academic year 2022/2023.

V. THE STUDY

5.1 Research Questions

The main objective of the present study is to assess GU student's degree of satisfaction with the learning experience in the English for Effective Communication University required course taught during the Spring semester of the academic year 2022/2023.

The study is sought to answer the following research questions:

- What is ENG118- English for Effective Communication Learning Outcomes?
- What are the topics of the English for Effective Communication course Learning Outcomes?

- To what level are GU students satisfied with the English for Effective Communication Course Structure?
- To what level are GU students satisfied with the English for Effective Communication Course instructor?
- To what level are GU students satisfied with the English for Effective Communication Course in General?

5.2 Methodology

The study was conducted over one academic semester and involved a total of 20 students enrolled in advanced English for Effective Communication course at Gulf University. The course was structured to include lectures, group work, peer review, and individual assignments. Data was collected through a survey of student's satisfaction with the course, which included both quantitative and qualitative questions. The survey was administered at the end of the spring semester of the academic year 2022/2023, and students were asked to rate their satisfaction with various aspects of the course, such as course content, teaching methods, and course instructor.

5.3 Population and Sample

The population for this study comprised all Gulf University students eligible to take the English for Effective Communication University required course. The sample for this research consisted of 20 GU students from various departments who enrolled in ENG 118 during the spring semester of the academic year 2022/2023.

5.4 Study Instrument

The study utilized the GU Course Evaluation Survey Questionnaire as the instrument for data collection. The GU CESQ report was employed to analyze the course evaluation surveys for the General Sciences Unit. This report provides an average satisfaction rating for each question in the survey, as well as the satisfaction average per faculty. Additionally, the report includes the maximum and minimum average ratings per faculty, enabling the identification of strengths and weaknesses.

The course evaluation survey consists of two sections: Course Level Questions and Instructor Level Questions. These sections contain a total of 20 items, with 10 items in each section.

Section 1: Course-Level Questions

One of the most common indirect course assessment methods is the course evaluation

survey. In addition to providing useful information for improving courses, course evaluations provide an opportunity for students to reflect and provide feedback on their learning. Table 1 presents the types of questions included in course-level assessment questions.

Table 1: Course-Level Questions Statements

Item	SA	SDA			
	5	4	3	2	1
1. The course aims and intended learning outcomes were clearly stated and explained					
2. An appropriate range of teaching and learning methods were implemented in accordance with course type and contents					
3. An appropriate range of assessment methods was aligned with the learning outcomes					
4. Course subjects and assessments were well arranged and balanced during the semester					
5. Course material, books and references, readings, and handouts were adequate and supported learnings					
6. Utilized spaces, devices, tools, and software were appropriate and supported learnings					
7. My knowledge and understanding were developed in accordance with the course					
8. My practical skills were developed in accordance with the course					
9. My intellectual skills were developed in accordance with the course					
10. My general and transferable skills (communication, teamwork, time management) were developed					

Section 2: Instructor-Level Questions

The aim of teacher evaluations, specifically through student teaching surveys, is to gather valuable insights that can drive action. A robust

system of teacher evaluation will accomplish the following: Evaluate the efficacy of your instruction, enabling you to replicate successful strategies and revise those that do not engage students effectively.

Table 2: Instructor-Level Questions Statement

Item	SA	SDA			
	5	4	3	2	1
1. The instructor adhered to class schedules with efficient utilization of class hours					
2. The instructor specialized in the course and taught the course subjects successfully					

3. The instructor communicated clearly and successfully with the students				
4. The instructor provided sufficient feedback on students' work within a reasonable time				
5. The instructor preserved respectful and fair relations and treatment with all students				
6. The instructor succeeded to engage students in course activities in both face-to-face and online sessions with active participation and collaboration				
7. The instructor linked real-life examples to the course subjects				
8. The instructor encouraged students' enthusiasm and independent learning while delivering face-to-face/online or hybrid sessions				
9. The instructor's support outside of the class has been accessible through office hours and on digital platforms.				
10. The instructor provided appropriate guidance and support to students to shift back towards face-to-face education after the pandemic.				

To evaluate students' satisfaction with the learning experience, both course-level questions and instructor-level questions are employed. It is important to note that the course evaluation survey was developed, revised, and validated by the GU Quality Assurance Department. The questionnaire was administered during the Spring 2022-2023 semester, and the data collected from students was analyzed by the authorized unit.

intercultural communication, professional presentations, negotiation, group discussions, public speaking, dialogues, and debates. For further details, please refer to Table 3, which presents the course's intended learning outcomes (ILOs), teaching-learning approaches, and assessment strategies.

VI. RESULTS

Results related to question 1: What is ENG118- English for Effective Communication Learning Outcomes?

The results pertaining to question 1, "What is ENG118- English for Effective Communication Learning Outcomes?" indicate that English for Effective Communication is categorized as a level 5 course on the National Qualifications Framework (NQF) in Bahrain. This course emphasizes the fundamentals of English communication and equips students with effective techniques for conveying ideas and concepts through reading, writing, listening, and speaking skills. It encompasses communication in academic and daily life, as well as in study and work environments. Additionally, the course fosters critical thinking skills and explores

Table 3: ENG118 Intended Learning Outcomes, teaching, learning, and assessment methods

After successful completion of the course, a student will be able to:			
Intended Learning Outcomes		Teaching and Learning Methods	Assessment Methods
LO1: K-TU	Demonstrate generalized knowledge and understanding of common grammatical structures, errors, and verbal and written messages in the English language relevant to various disciplines.	Lecture Exercises	Mid-Term Exam
LO2: S-A	Analyse different texts and orations while applying reading and writing strategies in a comprehensive manner.	Lecture Individual and group activities Class discussions Exercises	Quiz Mid-Term Exam Class Participation
LO3: S-C	Display effective listening and speaking skills using vocabulary and grammar in the English language for academic and professional purposes.	Lecture Individual and group activities Class discussions Exercises	Listening & Speaking Test
LO4: S-C	Demonstrate effective reading and writing skills to compose a variety of texts, paragraphs, and essays, and cite electronic and library resources for referencing appropriate to various disciplines.	Individual and group activities Class discussions Exercises	Assignment 1, Mid-Term Exam, Final Portfolio
LO5: C-A	Display life-long learning and independent learning competencies to enhance skills of expressing opinion through constructive dialogue relevant to the profession.	Individual activities Class discussions Exercises	Listening & Speaking Test, Final Portfolio
LO6: C-R	Demonstrate ethical responsibility to submit original work and academic integrity for referring work, and quotes of others.	Group activities Reading exercises Discussion	Final Portfolio, Assignment 2
LO7: C-C	Carry out individual and group tasks in a collaborative environment within the given time frame.	Group activities Debate	Final Portfolio

The relationship between course-intended learning outcomes (ILOs), teaching-learning, and assessment strategies is critical for ensuring that students achieve their learning goals. Intended learning outcomes (ILOs) are specific statements that describe what students are expected to know, understand, or be able to do by the end of a course. These statements provide a clear understanding of what students should be able to achieve and guide the design of teaching and assessment strategies.

- *Teaching and learning activities:* To ensure students achieve the desired learning outcomes, teaching and learning activities

must be thoughtfully designed. This entails selecting suitable teaching methods, materials, and activities that align with the intended learning outcomes (ILOs). For instance, if the goal is to foster critical thinking skills, teaching approaches like problem-based learning, case studies, or debates may be more fitting than traditional lectures.

- *Assessment strategies:* To maintain alignment with the intended learning outcomes (ILOs), assessment strategies should be carefully chosen. This includes selecting appropriate assessment methods, tasks, and criteria that effectively measure students' attainment of the

desired learning outcomes. For instance, if the ILO is focused on writing a research paper, an assessment task that requires students to conduct research, analyze data, and present their findings may be more suitable than a multiple-choice test. By aligning assessment approaches with the ILOs, educators can accurately gauge students' achievement and promote meaningful learning experiences.

- *Providing feedback to students:* Offering feedback to students is a crucial component of the teaching-learning process. It should be provided consistently throughout the course, rather than solely at the term's conclusion, to assist students in enhancing their learning. Effective feedback should be specific, timely, and directly linked to the intended learning outcomes (ILOs). This helps students comprehend their accomplishments and areas for improvement, providing them with valuable insights to progress in their learning journey.

In conclusion, the interplay between course-intended learning outcomes (ILOs), teaching-learning approaches, and assessment strategies is pivotal in facilitating students' attainment of their learning objectives. By aligning teaching and assessment strategies with the ILOs, a cohesive and well-defined course design is established, thereby fostering an environment conducive to student learning and success.

Results related to question 2: What are the topics of the English for Effective Communication course Learning Outcomes?

The findings regarding question 2, which pertains to the topics covered in the English for Effective Communication course Learning Outcomes, illustrate that the course concentrates on enhancing students' English communication skills. It encompasses a wide range of topics related to communication, including:

- *Listening skills:* This topic encompasses effective listening strategies such as active listening, note-taking, and asking clarifying questions.

- *Speaking skills:* This topic addresses effective speaking strategies such as organizing ideas, using appropriate language, and adapting to diverse audiences.
- *Writing skills:* This topic encompasses effective writing strategies such as organizing ideas, using correct grammar and vocabulary, and editing and revising.
- *Reading skills:* This topic covers effective reading strategies such as scanning and skimming, identifying main ideas, and comprehending complex texts.
- *Interpersonal communication:* This topic focuses on effective communication strategies in personal and professional relationships, including active listening, empathy, and conflict resolution.
- *Intercultural communication:* This topic delves into effective communication strategies across cultures, including understanding cultural differences, adapting to different communication styles, and avoiding cultural misunderstandings.

Business communication: This topic addresses effective communication strategies in professional contexts, such as writing emails, delivering presentations, and negotiating.

The topics covered in the English for Effective Communication course aim to develop students' communication skills across various contexts and situations, fostering their confidence and effectiveness as English communicators. For more specific details, please refer to Table 4, which presents the ENG118 course topics and their corresponding ILOs.

Table 4: ENG118 topics and their related learning outcomes

Week	ILOs	Unit/Module/Topic Title	Teaching and Learning Methods	Assessment Methods
1	Lo2: S-A	<ul style="list-style-type: none"> Introduction to English for Effective Communication. Reading & Speaking Skills. Interpreting/Analysing Pictures 	Lecture Exercises	Quiz Mid-Term Exam
2	LO1 K-TU	<ul style="list-style-type: none"> Simple Present Tense Adverbs of Frequency Present Continuous Tense Discussion about daily routines Written exercises 	Lecture Individual and group activities Class discussions Exercises	Mid Term Exam
3	Lo4: S- C	<ul style="list-style-type: none"> Vocabulary Development Reading Comprehension Writing Activities +Discussion 	Individual and group activities Class discussions Exercises	Mid Term Exam
4	LO2: S- A	<ul style="list-style-type: none"> Reading Comprehension Reading for meaning, Skimming & Scanning, Discussion 	Lecture Individual and group activities Class discussions Exercises	Quiz 1 Mid Term Exam
5	LO4 S- C	<ul style="list-style-type: none"> Writing formal and informal texts Paragraph Writing 	Individual activities Class discussions Exercises	Assignment 1
6	LO3 S- C	<ul style="list-style-type: none"> Listening Skills Watching a video + Discussion 	Individual and group activities Class discussions Exercises	Listening & Speaking Test
7	LO3 S- C	<ul style="list-style-type: none"> Listening strategies Listening to Tape Scripts & filling out worksheets to improve grammar/vocabulary & Writing Skills. 	Class discussions Exercises	Listening/Speaking Test
8	LO1 K-TU Lo2 S-A LO4 S-C	<ul style="list-style-type: none"> Review 	Lecture Individual activities	Mid Term Exam
9		<ul style="list-style-type: none"> Mid-Term Exam 		

10	LO6 C-R	<ul style="list-style-type: none"> • Essay Writing • Plagiarism, Use of Quotations in Writing • Giving References 	Group activities Discussion	Assignment 2
11	LO7 C-C	<ul style="list-style-type: none"> • Writing Advertisements • Use of catchy language • Designing colourful Adverts 	Group activities Peer review	Final Portfolio
12	LO5 C-A	<ul style="list-style-type: none"> • Blog Writing 	Group activities Reading exercises Discussion	Final Portfolio
13	LO2: S-A	<ul style="list-style-type: none"> • Effective reading strategies 	Individual and group activities Class discussions Exercises	Participation
14	LO4 S-C	<ul style="list-style-type: none"> • Notes-taking 	Individual and group activities Class discussions Exercises	Final Portfolio
15	LO7 C- C	<ul style="list-style-type: none"> • Final Portfolio 	Independent learning	Final Portfolio

The connection between course topics and their corresponding learning outcomes is crucial. Learning outcomes are specific goals or objectives that students are anticipated to accomplish by the course's conclusion, and they are directly linked to the course topics. Put simply, the course topics determine the subject matter covered in the course, while the learning outcomes outline what students should know, comprehend, or be capable

of doing as a result of studying that subject matter. These learning outcomes provide a clear framework for assessing students' progress and ensuring that they have attained the desired knowledge and skills from the course.

Results related to question 3: To what level do GU students satisfy with the English for Effective Communication Course in General?

Table 5: Course-Level Questions Statements

Item	SA					M
	5	4	3	2	1	
1. The course aims and intend learning outcomes were clearly stated and explained	12	3			1	4.56
2. An appropriate range of teaching and learning methods were implemented in accordance with course type and contents	12	3	1			4.69
3. An appropriate range of assessment methods was aligned with the learning outcomes	10	1	1			4.56
4. Course subjects and assessments were well arranged and balanced during the semester	11	4	1			4.63
5. Course material, books and references, readings, and handouts were adequate and supported learnings	9	7				4.56

6. Utilized spaces, devices, tools, and software were appropriate and supported learnings	8	7	1			4.44
7. My knowledge and understanding were developed in accordance with the course	10	4	2			4.50
8. My practical skills were developed in accordance with the course	10	5	1			4.56
9. My intellectual skills were developed in accordance with the course	11	5				4.69
10. My general and transferable skills (communication, teamwork, time management) were developed	11	5				4.69
11. The instructor adhered to class schedules with efficient utilization of class hours	12	4				4.75
12. The instructor specialized in the course and taught the course subjects successfully	13	2	1			4.75
13. The instructor communicated clearly and successfully with the students	11	3	2			4.56
14. The instructor provided sufficient feedback on students' work within a reasonable time	11	5				4.69
15. The instructor preserved respectful and fair relations and treatment with all students	12	4				4.75
16. The instructor succeeded to engage students in course activities in both face-to-face and online sessions with active participation and collaboration	10	5	1			4.56
17. The instructor linked real-life examples to the course subjects	13	3				4.81
18. The instructor encouraged students' enthusiasm and independent learning while delivering face-to-face/online or hybrid sessions	11	4	1			4.63
19. The instructor's support outside of the class has been accessible through office hours and on digital platforms.	10	5	1			4.56
20. The instructor provided appropriate guidance and support to students to shift back towards face-to-face education after the pandemic.	11	5				4.69
Satisfaction with instructor	114	40	6	-		4.68
Satisfaction with the course structure	104	49	7	-	1	4.59
Satisfaction with the course in general	218	89	13	-	1	4.63

Source: GU-Quality Assurance Unit (2023)

Results related to question 4: To what level do GU students satisfy with the English for Effective Communication Course Structure?

The course structure and components of English for Effective Communication may vary

depending on the institution and the specific goals of the course. However, in general, the course may include the following components:

- *Course overview:* This component introduces the course and its objectives. It may include a

description of the course topics, learning outcomes, and assessment methods.

- *Course materials:* This component includes the materials and resources that students will use during the course, such as textbooks, articles, videos, and online resources.
- *Lectures and discussions:* This component include lectures and discussions led by the instructor to introduce and explain course topics. It may also include group discussions or activities to encourage student participation and engagement.
- *Assignments and projects:* This component include the assignments and projects that students will complete to demonstrate their understanding of the course topics. These may include written or oral presentations, group projects, reflective essays, or research papers.
- *Quizzes and exams:* This component include the quizzes and exams that students will take to assess their understanding of the course material. These may include multiple-choice questions, short answer questions, essays, or other types of assessments.
- *Feedback and evaluation:* This component includes feedback and evaluation provided by

the instructor to help students improve their learning. It may include feedback on assignments, quizzes, and exams, as well as evaluations of student participation and engagement.

- *Course conclusion:* This component provides a summary of the course and its outcomes. It may include a review of the course topics, a reflection on the learning process, and recommendations for future learning.

Overall, the course structure and components of English for Effective Communication aim at providing students with a comprehensive and engaging learning experience that develops their communication skills in English. The course may be delivered in a traditional classroom setting or online and may vary in duration and intensity depending on the institution and the specific goals of the course.

To test how GU students are satisfied with English for an Effective Communication course (ENG118), 16 out of the 20 students respond to the course evaluation survey. Table 5 presents the participant's response frequency as well as the average of the responses for each statement/question.

Table 6: Course-Level Questions Statements

Item	SA					SDA	M	SD
	5	4	3	2	1			
21. The course aims and intend learning outcomes were clearly stated and explained	12	3			1	4.56		
22. An appropriate range of teaching and learning methods were implemented in accordance with course type and contents	12	3	1			4.69		
23. An appropriate range of assessment methods was aligned with the learning outcomes	10	1	1			4.56		
24. Course subjects and assessments were well arranged and balanced during the semester	11	4	1			4.63		
25. Course material, books and references, readings, and handouts were adequate and supported learnings	9	7				4.56		
26. Utilized spaces, devices, tools, and software were appropriate and supported learnings	8	7	1			4.44		
27. My knowledge and understanding were developed in accordance with the course	10	4	2			4.50		

28. My practical skills were developed in accordance with the course	10	5	1			4.56	
29. My intellectual skills were developed in accordance with the course	11	5				4.69	
30. My general and transferable skills (communication,teamwork, time management) were developed	11	5				4.69	
31. Satisfaction with the course	104	49	7	-	1	4.59	

Source: GU-Quality Assurance Unit (2023)

Results related to question 5: To what level do GU Students Satisfied with the English for Effective Communication Instructor?

Table 7: Instructor-Level Questions Statements

Item	SA					M	SD
	5	4	3	2	1		
32. The instructor adhered to class schedules with efficient utilization of class hours	12	4				4.75	
33. The instructor specialized in the course and taught the course subjects successfully	13	2	1			4.75	
34. The instructor communicated clearly and successfully with the students	11	3	2			4.56	
35. The instructor provided sufficient feedback on students' work within a reasonable time	11	5				4.69	
36. The instructor preserved respectful and fair relations and treatment with all students	12	4				4.75	
37. The instructor succeeded to engage students in course activities in both face-to-face and online sessions with active participation and collaboration	10	5	1			4.56	
38. The instructor linked real-life examples to the course subjects	13	3				4.81	
39. The instructor encouraged students' enthusiasm and independent learning while delivering face-to-face/online or hybrid sessions	11	4	1			4.63	
40. The instructor's support outside of the class has been accessible through office hours and on digital platforms.	10	5	1			4.56	
41. The instructor provided appropriate guidance and support to students to shift back towards face-to-face education after the pandemic.	11	5				4.69	
42. Satisfaction with instructor	114	40	6				

Source: GU-Quality Assurance Unit (2023).

The results of the study indicate that students were highly satisfied with the English for Effective Communication course offered at Gulf University. The majority of students rated the course content, teaching methods, and feedback as very good or excellent. Specifically, students identified the following factors as contributing to their satisfaction: the relevance of the course content to their future careers, the use of real-world examples and case studies, the interactive nature of the course, and the timely and constructive feedback provided by the instructor.

VII. DISCUSSION

Biggs and Tang (2011) argue that teaching, learning, and assessment should be aligned with the intended learning outcomes (ILOs) to ensure that students are achieving the intended goals. They suggest that teaching should be designed to help students achieve the ILOs, assessment should be designed to measure the extent to which the ILOs have been achieved, and feedback should be provided to help students improve their learning.

Marzano (2001) suggests that educational objectives should be organized into a taxonomy that includes four domains: cognitive, affective, psychomotor, and interpersonal. He notes that teaching, learning, and assessment should be aligned with the objectives in each domain to ensure that students are achieving the intended goals.

Wiggins and McTighe (2005) propose a framework called "Understanding by Design" (UbD) that emphasizes the importance of aligning teaching, learning, and assessment with the intended learning outcomes (ILOs). They suggest that teachers should begin by identifying the ILOs, then design assessments that measure the extent to which students have achieved those goals, and finally design instructional activities that help students achieve the ILOs.

The above-mentioned studies support the idea that teaching, learning, and assessment should be aligned with the intended learning outcomes (ILOs) to ensure that students are achieving the intended goals. This can be achieved by designing

teaching activities and assessment strategies that are directly related to the ILOs, and by providing feedback to students to help them improve their learning. The frameworks proposed by Biggs and Tang (2011), Marzano (2001), and Wiggins and McTighe (2005) provide useful guidance for aligning teaching, learning, and assessment with the ILOs.

The relationship between course topics and their related learning outcomes is well-established in the field of education and is supported by research. Here are a few examples of studies that have examined this relationship. In a study by Granath, Ziegler, and Nilsson (2017), the authors found that there is a strong relationship between course content and learning outcomes in higher education. They state, "The learning outcomes of a course should be directly related to the course content to ensure that students acquire the expected knowledge and skills" (p. 120).

In a review of the literature on learning outcomes in higher education, Kuh (2008) notes that "learning outcomes are often closely linked to the content of specific courses or programs" (p. 12). Kuh also notes that learning outcomes should be clearly defined and aligned with the course content to ensure that students are achieving the intended goals.

In a study by Bloom et al. (1956), the authors developed a taxonomy of educational objectives that includes three domains: cognitive (knowledge), affective (attitudes and values), and psychomotor (skills). The cognitive domain is particularly relevant to the relationship between course topics and learning outcomes, as it includes objectives related to knowledge and understanding. Bloom et al. state that "educational objectives should be stated in terms of the changes that are to be brought about in the student" (p. 7), which implies that the objectives should be directly related to the course content.

Overall, these studies suggest that there is a strong relationship between course topics and their related learning outcomes. Course content should be aligned with the intended learning outcomes to ensure that students are acquiring

the expected knowledge and skills. In addition, learning outcomes should be clearly defined and stated in terms of the changes that are to be brought about in the student, which implies a direct relationship between the objectives and the course content.

The findings of this study support previous research that has identified various factors contributing to student satisfaction in higher education. The study specifically highlights the importance of course content, teaching methods, and feedback in satisfying the needs of students in technical writing courses. The interactive nature of the course, which included group work, peer review, and individual assignments, was a key factor contributing to student satisfaction.

VIII. CONCLUSION

In conclusion, this paper has examined the level of satisfaction of students in an English for Effective Communication course offered at Gulf University. The study has shown that students were highly satisfied with the course and identified course content, teaching methods, and feedback as key factors contributing to their satisfaction. The paper concludes with recommendations for educators on how to design and deliver courses that satisfy the needs of students, such as incorporating real-world examples and case studies, providing timely and constructive feedback, and utilizing interactive teaching methods.

SUGGESTIONS AND RECOMMENDATIONS

Based on the results of the present study and the reviewed literature, the study generates the following suggestions and recommendations that can help to improve student satisfaction with learning English for Academic Purposes.

- *Provide clear learning objectives:* Clearly state the learning objectives for the course and each lesson. This helps students to understand what they are expected to learn and how their learning will be assessed.
- *Use active learning strategies:* Use active learning strategies, such as group work, case

studies, and problem-based learning, to engage students and promote deeper learning. Active learning strategies have been shown to improve student satisfaction with learning (Prince, 2004).

- *Provide timely and constructive feedback:* Provide timely and constructive feedback on student work to help students understand their strengths and areas for improvement. Feedback should be specific, actionable, and focused on the learning objectives.
- *Use a variety of assessment methods:* Use a variety of assessment methods, such as quizzes, exams, papers, and projects, to assess student learning. This can help to accommodate different learning styles and provide students with multiple opportunities to demonstrate their knowledge and skills.
- *Create a supportive learning environment:* Create a supportive learning environment by being approachable and available to students, encouraging student participation, and fostering a sense of community in the classroom. This can help to promote student engagement and satisfaction with learning.
- *Incorporate technology:* Incorporate technology into the course to enhance student learning and engagement. This might include using online discussion forums, interactive multimedia, or educational games.

By implementing these suggestions and recommendations, educators can create a more engaging and effective learning experience for their students, which is likely to result in higher levels of student satisfaction with learning.

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thoughtful questions, and contributed to a dynamic and engaging learning environment. Their active participation has not only enriched the learning experience for themself but also for their classmates.

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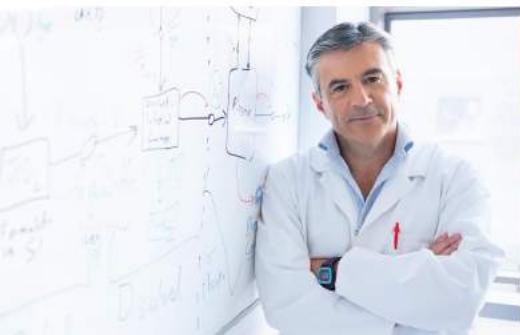
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