Meánscoil na mBráithre Críostaí, Cill Chainnigh
Christian Brothers Secondary School, Kilkenny.

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NUMERACY POLICY March 2018

School Name:	Christian Brothers Secondary School, Kilkenny
School Address:	James's Street, Kilkenny
School Details:	CBS Kilkenny is a Voluntary Roman Catholic Secondary School under the Trusteeship and the Patronage of the Edmund Rice Schools Trust. The School is grant aided by the Department of Education & Skills and is a single sex (boys) school.
School Management:	The Board of Management of CBS Kilkenny is a statutory Board appointed pursuant to the provisions of the Education Act 1998.

Mission Statement

Inspired by its founder, CBS Kilkenny aims to provide Catholic education in the Edmund Rice tradition. The school endeavours to be a caring Christian Community which promotes to the best of its ability the personal, spiritual, physical and intellectual development of its students.

Ethos

As an Edmund Rice School, CBS Kilkenny seeks to promote the five key elements of an Edmund Rice School as espoused by the ERST Charter:

- Nurturing faith, Christian spirituality and Gospel-based values
- Promoting partnership in the school community
- Excelling in teaching and learning
- Creating a caring school community
- Inspiring transformational leadership.

Aim

The aim of the Numeracy Policy is to provide for and support an environment that fosters awareness and appreciation of numeracy and an eagerness to engage with it in both abstract and contextual situations.

Rationale

When launching the national literacy and numeracy Strategy, *Literacy and Numeracy for Learning and Life 2011-2020*, the Minister for Education and Skills stated "Without the skills of literacy and numeracy, a young person or adult is often denied full participation in society.... I am convinced that ensuring all our young people acquire good literacy and numeracy skills is one of the greatest contributions that we can make towards achieving equality and social justice in our country". At CBS Kilkenny we aim to ensure that we maintain a strong focus on literacy and numeracy skills, within a broad and balanced curriculum.

Definition of Numeracy

Numeracy is not limited to the ability to use numbers to add, subtract, multiply and divide. Numeracy is the capacity, confidence and disposition to use mathematics to meet the demands of learning, school, home, work, community and civic life. This perspective on numeracy emphasises the key role of applications in the learning of mathematics, and illustrates the way that mathematics contributes to the study of other disciplines.

Key Players

In CBS Kilkenny five main partners are involved in the enhancement of numeracy within the school:

- Management
- Non-maths teachers
- Maths Teachers
- Learning Support team and SNAs
- Students and Parents.

Their roles and responsibilities are detailed below.

Role of Management

Management in CBS Kilkenny has ultimate responsibility for the implementation of all school policies. As an integral driver of numeracy in the school, management aims to:

- Facilitate CPD for staff within the limitations of timetabling and budgets. The training of key staff members to deliver internal in-service training to all staff members will be prioritised.
- Set aside financial resources to support numeracy initiatives, e.g. In-service training for staff, funding for Maths Week etc.
- Support Numeracy within timetabling where practicable.
- Reiterate the commitment of the school to numeracy at each available opportunity: Staff Meetings, Parent Council meetings, Parent Information evenings, Open Night and other student meetings. Use the school Newsletter and other media, such as the school website, to support Numeracy initiatives in CBS Kilkenny.
- Request that the Board of Management ratifies the Numeracy Policy and subsequent School Self-Evaluation (SSE) Report and Plan, and to keep the Board informed of the progress of numeracy initiatives under the Teaching & Learning item on the agenda.
- Support links with outside agencies which will underpin the numeracy policy, e.g. College and 'Association' Quizzes, Engineering Events with STEPS, TYPE (TY Physics Experience), Junior Achievement Awards, STEM etc.
- Support a diverse range of methodologies which promote numeracy at all levels and abilities within the school.
- Support student wellbeing by promoting maths as a means of connecting students to their school, their friends, community and the wider world.

Role of Non-Maths Teachers

(Refer to APPENDIX A for further ideas on how to integrate numeracy into a range of subjects.) Non-maths teachers play an important role in integrating numeracy into their lessons, raising awareness of the widespread presence and application of numeric concepts in our everyday lives. The students' wellbeing is founded on a confidence in their ability to process numerical realities.

The responsibilities of non-maths teachers include the following:

- Be familiar with the definition of numeracy and its relevancy in their subject
- Include reference in subject plans regarding commitment to numeracy
- Generate a bank of resources and share them within the department
- Have a print rich environment in their classroom supporting numeracy
- Avail of CPD where possible and disseminate good practice within the department
- Expand the focus of lessons to emphasise the numeric element when appropriate
- Incorporate a numeracy question in tests where appropriate.
- Support students in using the 'Map My Progress' section in their diaries, building their resilience.

Table 1 below summarises some suggested approaches. Further suggestions are provided in APPENDIX A.

Subject	Numeracy Strategies
Gaeilge & Modern Foreign Languages	Numbers translated, calendar, clock, shopping, money, costing for a trip/holiday/event. Estimating dimensions of landmarks etc.
English	Calendar, location of quotations with page number and line, timed assignments using online clock, estimating, language of information, searching for evidence, statistics etc.
Geography	Maps, grid references, weather data charts, population pyramids, field study data displayed in numbers and chart format, trade games etc.
History	Date line, timeline of key events, estimating, evidence, critiquing data, statistical analysis etc.
Music	Notes and values, extracts of music displayed on walls with beat value shown, timing rhythm, beats etc.
Religion	Date line, timeline of key events, estimating, analysing data and statistical concepts, CSO figures, Calendar of religious festivals/dates
Physical Education	Score boards, points for games, diagrams for strategies, bar charts of fitness levels, timing, weights, etc.
Art	Painting by numbers, date line for painting periods, estimating, portioning, drawing to scale, segment sketching
ICT	Formulae for excel, spreadsheets, grades, averages, points calculations etc.
Science	Periodic table, measurements, estimating, graduating, weighing, calculating, atomic structures etc.
Home Economics	Varying temperatures electric/fan ovens, times for cooking/storage, calendar of seasonal foods/fruits etc.

Business	Profit and loss accounts, balance sheets, estimating, predictions, projections, surplus etc.
Technologies	Measurement, estimating, furnace heat, flame, tension of materials, melting points, joints, drawing to scale etc.

Table 1: Numeracy Strategies for non-maths teachers

Role of Maths teachers

(Refer to APPENDIX A for further ideas on how to integrate numeracy into a range of other subjects.)

Maths teachers play a pivotal role in raising awareness of the widespread presence and application of numeric concepts in our everyday lives. It is equally important that the maths teachers assume a guidance role with regard to non-maths teachers. This involves supporting them in integrating numeracy into their subjects. The Mathematics Department recognises its role in promoting and advocating a positive approach to the CBS numeracy policy through its Department Subject Plan.

In addition, the Maths Department further promotes a culture of numeracy by:

(a) Being aware of mathematical techniques/processes/skills which overlap in other subject areas and by supporting non–maths teachers in their objective of promoting numeracy in their specific subject area.
(b) Availing of and providing opportunities for CPD within the Maths Department and all teaching staff.
(c) Standardising methodologies and assessment where appropriate and using this as a basis upon which student attainment can be analysed and methodologies can be adjusted to reflect agreed necessary changes.
(d) Focusing on the application of mathematical concepts, understanding mathematical terms, application of a variety of methods in problem solving, collecting, handling, interpreting and presenting data and carrying out procedures accurately.
(e) Being aware of the approaches to numeracy being adopted by non–maths teachers and to adopt and implement such approaches into maths classes.
(f) Promoting the value of achievement at both Higher and Ordinary Level in state examinations.
(g) Promoting numeracy through many co-curricular activities, e.g. Maths Week, Visual Displays, Statistics Noticeboard, National Quizzes, etc.
(h) Informing non-maths teachers of the schedule of topics being taught in first year.
(i) Introducing one calculator model school-wide (for all subjects)
(j) Advising non-maths teachers on simple effective strategies to increase the emphasis on numeracy in their lessons.
(k) Adopting consistency of approach in several key areas (more can be added): factorising, getting %, adding fractions, increasing/decreasing by 20%, slope calculation, simultaneous equations, elements of a graph, greater than/less than……

(l) Running competency test in Aug/Sept of first year. Identify problem areas and strategise for them.
(m) Inculcating a culture of estimation, calculation and checking.
(n) Encouraging mental arithmetic in Calculator-free zone
(o) Using a keyword section of the board for Literacy and Numeracy
(p) Deploying mainstream maths teachers in the SEN Department
(q) Having a print rich environment in classrooms which displays both student and commercial numerical resources

Role of the Learning Support Department

(Refer to APPENDIX A for further ideas on how to integrate numeracy into LS)

The Learning Support (LS) Dept plays an important role in supporting students who find numerical concepts challenging and demotivating. To overcome these difficulties, the LS Dept aims to:

- ensure that every student leaving school has an appreciation for, and a working understanding of, numeracy.

- arrange for the administration, correction and analysis of results of standardised testing in Literacy and Numeracy in September in First Year.

- analyse the results of standardised test results/transfer data/psychological reports etc., and to identify students who need support in developing their numeracy skills.

- prioritise students who are performing at or below the 10th percentile on standardised tests in mathematics.

- place significant importance on the development of numeracy skills when drafting these students' Individual Educational Plans (IEPs), and will set SMART targets for these students in relation to improving numeracy skills.

- share this information in a collaborative manner with subject teachers so that each teacher will be in an informed position to encourage and help students to develop their numeracy skills across all their subjects.

Suggested strategies to engage LS students with meaningful, investigative and problem-based learning, including:

- Mental routines - 10 minute lesson starters with suggested closed, open and flip questions designed to engage students and arouse their enthusiasm.
- Problematical situations - challenges that encourage students to work mathematically with open-ended "real life" situations and construct their own ideas. These lessons include a reflection session where mathematical language is used to describe successful strategies and where more formal methods are introduced and demonstrated.
- Investigations - open-ended investigations to encourage students to test and expand their skills.
- Games - fun activities designed to reinforce the strategies developed in each unit.
- Assessment activities - consolidation activities that students should readily complete at the end of each unit.

Role of Students and Parents

Children with good numeracy skills are more likely to:

- Stay in education longer
- Be in work as adults
- Earn more throughout their lives.

Even if parents find maths and numeracy difficult, they can support their children using the following guidelines:

- **Do not** say things like 'I can't do maths' or 'I hated maths at school'… your son might start to think like that themselves…
- **Do** talk about the maths in everyday life, and ask your son how they work out problems or questions.
- **Do** praise your son for effort, rather than talent.
- **Do** encourage your son to do puzzles and to play logical games.
- **Do** encourage your son to practice practical maths like shopping, cooking, map reading, communicating and presenting information, looking for and recognising patterns, ~~using~~ estimating and deciding if an estimate is "reasonable", calculating.....

In turn, each student has a responsibility to enhance his own numeracy and can follow the tips above provided for parents. In addition, it is important that the student partakes fully in classwork, homework, fieldwork and project work. Teamwork is educational and rewarding and it is important that each student partakes to the best of his ability.

There is a far reaching national strategy to support and enhance numeracy levels for Irish students. The student can maximise the positive impact of this strategy by adopting a positive attitude and willingness to learn.

Approval

This policy has been approved by CBS Kilkenny Board of Management.

Signed: _____ Date: _____
Chairperson, Board of Management

APPENDIX A

Numeracy Strategy
In-Service Presentation to Staff
CBS Kilkenny

Sep 2013, D. Maguire (updated, minor changes Aug 2014) *(updated Dec 2017)*

Where is numeracy in my subject?

Numeracy includes all of the following:
Numbers, digits, size, order, scaling, ratios, time, distance, estimates, formulas, graphs, data analysis, trends, slopes, directions, chance, populations, census, coordinates, shape, timelines ..... and loads more.

Please note: this document is available on the Principal to Staff Noticeboard in Google drive

Contents

Best websites

www.jct.ie
www.curriculumonline.ie
http://pdst.ie/node/632 This is the MAIN source for all things L&N related
http://schoolself-evaluation.ie/post-primary/
www.juniorcycle.ie

Resources in this document have been sourced from:
http://nzmaths.co.nz/
http://learning.wales.gov.uk/resources/numeracy-sample-materials/?lang=en

Probability charts and words for prob.
http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2011/index.php?id=numeracy/nn_numb/nn_numb_s3e_11
Fractions
http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2011/index.php?id=numeracy/nn_numb/nn_numb_s3d_11
Large numbers
http://www.schools.nsw.edu.au/learning/7-12assessments/naplan/teachstrategies/yr2011/index.php?id=numeracy/nn_numb/nn_numb_s3a_11
Mazes ready to go:
http://nzmaths.co.nz/resource/amazing-mazes?parent_node=

Support and Rollout

Responsibilities of Numeracy Team:

- Diverse group from: Maths, Language, Business, Science, History/Geography, Practical+PE, Careers/Special Education Needs (SEN), English
- Develop Numeracy Policy
- Attend and disseminate Numeracy CPD
- Disseminate information back to subject depts.
- Someone from Literacy team should also be part of Numeracy team
- Vary the team members from year to year to distribute expertise, but retain the Link people permanently

General approaches for Non-Maths teachers:

- Recognise Numeracy in your own subject and integrate it, raising awareness
- Look at maths schedule for first year
- Have a 24hr and hand clock in your room or chart displaying 24hr time comparators.
- Have number of your room in normal digits and roman numerals
- Display work that involves Numeracy
- Incorporate Numeracy question into all exams if practicable
- One calculator model school wide (including all teachers)
- When showing a video, have students draw a timeline and mark key points on it. Display where practical
- Estimate, calculate, check
- Graphs: use terms such as CENTRAL TENDENCY, RANGE, SPREAD, CONSISTENT, INCONSISTENT, TREND
- When the Numeracy group has evidence of problem areas, each dept must employ subject-specific strategies to address it.
- Brainstorm ideas at next subject dept meeting.
- Share expertise and resources and effective methodologies
- Build shared resource bank
- Add column to plan called L&N strategies/resources
- Add L&N review onto agenda for each meeting

Responsibilities of Maths Teachers:

- **Consistency** of approach in several key areas (more can be added):
  factorizing, getting %, adding fractions, increasing/decreasing by 20%, slope calculation, simultaneous equations, elements of a graph, greater than/less than……
- One calculator model school wide (including all teachers)
- Let non-maths teachers know WHEN key areas of course are covered, eg VAT, %, fractions, especially CIC.
- Run competency test in first year. Identify problem areas and strategise across school.
- Organise Statistics Noticeboard (TY to maintain)
- Estimate, calculate, check

First Year Maths Schedule

August-Christmas

Natural Numbers (positive whole numbers)
Integers (including negative whole numbers)
Fractions
Decimals
Sets
Algebra
Percentages
Probability (Chance) (definitely NOT=0, definitely SO = 1)
Perimeter and Area
Geometry: points, angles, lines

Christmas-May

Ratio, Proportion (scaling up and down)
Collecting Data (primary data, secondary data, questionnaires, bias)
Coordinates
Solving algebra equations
Triangles
Presenting data (charts/graphs/trends/axes, interpreting charts)
Measure
Constructions (DCG, bisect angles, construct triangles, etc...)

Subject ideas:

All subjects:

- Keyword section of board for Literacy, but also Numeracy section.
- Have mainstream maths teachers in SEN department
- Print rich environment displaying both student and commercial numerical resources
- It is really about emphasising the numerical content of lessons when possible and making students aware of the numeracy involved.
- Date on board
- Most subjects lend themselves to the use of a timeline or flowchart
- One calculator model school wide and consistent approach.

Languages

- Translating large numbers (worksheets and oral work)
- Write an essay about a weekend in Paris/Berlin/Dublin etc. with €500 euro to spend.
- Integrate words and terms such as "Halve it", Double it", "Increase it", "Decrease it", Equal to, same as, more than, less than, twice as much as, reducing, estimate, longer than, shorter than, Length (1 dimension), Area (2 dimensions), Volume (3 dimensions), average, minimum, maximum, higher, lower, most, least, enlarge, reduce, add on, take away (subtract), multiply, divide
  Maybe a dictionary of terms if appropriate.
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.
- Chance and Probability terms: go from 0 to 1 and everything in between.....never, maybe, probably, fifty-fifty, even chance, unlikely, very likely, definitely, always, certain
- Shapes: circle, square, triangle, pentagon, hexagon, cube, sphere, cone,
- Clock on wall (digital and analog).
  Units of time, century, year, hour, week, day, minute, second etc.
- Position and directional terms: above, below, under, over, left, right, central, diagonal.
  Use a gridded maze and ask students to give directions verbally/written. Half-turn, Quarter-turn. North, South East, West, NE, SW etc.
- Common units: Mass (kg, g), Length (km, m, cm, mm), Time (hr, min, sec),
- Fractions: translate common fractions. ½, ¾, $5^{1}/_{4}$, etc.
  Have fraction sheets on wall with translated terms.

- Money: calculate amounts and change then translate
- Write essays with strong numerical content, such as describing route home from the point of view of time taken and lengths travelled.
- Personal stats: age, height, weight.
- Have comparative sizes translated on wall, big, bigger, smaller, increasing, decreasing, appreciating, depreciating, reducing, halving, doubling, trebling etc.

Maths

- Mental arithmetic
- Calculator free zone
- Estimation, trial and error. Then verify if answer is reasonable.
- Non-calculator test for incoming first years, repeated at end of first year.
- Number line on wall
- Put student graphs/Venn diagrams/number lines/clocks, etc. on walls
- Use timetables to calculate length of TV programs, train journeys, etc.
- Use household bills in class
- Use of learning strategies, graphic organisers from the Professional Development Service for Teachers (PDST.ie)

History

- Timeline projects and posters, historic individuals and developments
- Timeline for biographies
- Ageing: rings of tree, depth of an archaeological find, carbon-dating, timeline for important events/biographies, estimating, codes, census, primary and secondary data, surveys.
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.

Geography

- Area (e.g.country), Distance (kilometres/miles), Lengths(e.g. rivers), Compass directions.
- Grid references, Location using Eastings, Northings, Latitude, Longitude.
- Scale on maps.
- Weather charts: Rainfall, Temperature, Wind Speed, Sunshine - use of mathematical terms such as Average, range, increase, decrease, trend.

- Population studies: Total Population, Birth/Death Rates, Natural increase/decrease, Census, Population Pyramids.
- Employment: Pie charts-comparison, growth, trends.
- Tourism: Trends, Increase, Decrease.
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.
- Draw map of schoolyard/garden/route home etc. Try to keep a scale.
- Use calculator for computation (tie in with maths teachers for consistent use and model)

Woodwork

- Calculation, measurement, conversion of units.
- One calculator model school wide and consistent approach.
- Estimating then confirming

ART

- Posters with mathematical theme
- Geometrical shapes, perspective represents 3d on a 2d page, shading, Nets of objects
- Building models and scaling up/down
- Timeline for biographies
- Map of given topic (schoolyard, garden, route home)
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.

Religion

- Timeline for religious development/biographies
- Pie charts for religious populations
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.

Science

- Formulae on walls
- Emphasise the format and structure of Periodic table
- Mental arithmetic, estimation and confirmation
- Graphing skills: drawing graphs, interpretation and conclusions, key, units

- Common reactions on walls
- Drawing skills, 3d on a 2d page.
- Timeline for biographies/discoveries
- Non calculator work
- Much of the physics section, tables, graphs, trends, interpreting graphs and other data
- Classification, patterns
- One calculator model school wide and consistent approach.
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.

Home Economics

- Scaling up recipes
- Scaling up cooking and preparation times
- Weights and measurement posters on walls
- Calories, temperature, budgets

Business

- Calculating and estimating discounts, budgets, expenditure, saving.
- Profit and loss, markup, depreciation, appreciation, VAT, discounts
- GDP, GNP, budgets etc
- Timeline for establishing business: plan, market, strategise, distribute etc.
- One calculator model school wide and consistent approach.
- Understanding accounts and bills
- Tax, budgeting, billing, VAT, Data analysis, fractions, patterns

Music

- Beats in mathematical format on wall
- Notes and their values on wall
- Biographical timelines
- Short film: Allow students to trace a timeline as movie progresses and add comments/descriptors.

Technology

- Scale, proportion, measurement, protractor use, timing, modeling, patterns
- Fractions, %, decimals, units
- Estimates, geometry, lengths, timing, proportion,

- Lots of calculator use (tie in with maths teachers for consistent use and model)

PE

- Scoreboards, scorecards, layout for games, timing, clocks, estimates
- In all cases emphasis the numerical content.
- Calories, BMI, pulse rates
- League tables, calculating fitness test results and statistics, PE fitness, measuring distance covered.

Technical Graphics

- Angle measurement in all rotations
- Use of protractor
- Unit conversion
- Scaling up and down
- Key

CSPE

- Survey within class group, interpretation, graphic representation, critique data, conclude

Digital Literacy

- Excel, Scratch. Emphasize the numerical content of the lesson.

LCVP

- Aim to provide for and support an environment that fosters awareness and an appreciation of numeracy in LCVP through:
  - Clock on wall in room
  - Display work that involves numeracy
  - Timeline for establishing business, plan, market, strategies etc.
  - Payroll in business - VAT, Profit margins.
  - Marketing mix - ways of pricing products
  - Timeline for completion of portfolio displayed in room
  - Steps to follow for interviews
  - Entry requirements for their chosen career (i.e. college points)

SPHE

- Survey within class group, interpretation, graphic representation, critique data, conclude

CONSTRUCTION

- Calculation, measurement, conversion of units.
- One calculator model school wide and consistent approach.
- Estimating then confirming

Learning Support Strategies

Engage students with meaningful, investigative and problem-based learning.

1. Mental routines - 10 minute lesson starters with suggested closed, open and flip questions designed to engage students and arouse their enthusiasm.
2. Problematical situations - challenges that encourage students to work mathematically with open-ended "real life" situations and construct their own ideas.
3. Investigations - open-ended investigations to encourage students to test and extend their skills.
4. Games - fun activities designed to reinforce the strategies developed in each unit.
5. Assessment activities - consolidation activities that students should readily accomplish at the end of each unit.

Problem Solving Strategies which assist LS students:

- Draw a picture/diagram
- Act it out
- Make a model
- Guess, check and improve
- Make a table
- Spot a pattern
- Identify and use a mathematical operation
- Work backwards
- Work systematically
- Try a simpler case or break it up into manageable parts

Some initiatives to stimulate LS students

- 100 floors app for iPad. Very good for logical thinking
- Symmetry PowerPoint (available in shared-staff numeracy folder)
- Reading analog and digital clocks
- Height rule in classroom, linked to famous people if possible.

- Height charts of favourite celebrities…I am the same height as ….
- Signposts with measurements
- Markings on wall, floor
- Famous prime numbers
- Datelines
- Calendars, clocks, directions, fraction chart, % chart, number line (up/down), compass on wall
- Calculation of currency using units of Euros and cents