

MATHEMATICS: Educating for Justice and Peace



A Charter Initiative of Edmund Rice Education Australia



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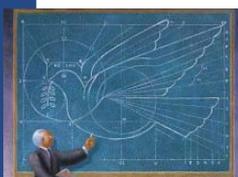
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The Micah Curriculum Formation Project aims to support teachers in integrating a spirituality of justice and peace across the curriculum. For more information please contact: micah@erea.edu.au

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Introduction

Mathematics is a global endeavour that has consequences for all of humanity. It has the power to create a world characterised by justice, peace, right relationships and environmental sustainability. As mathematics educators, we are presented with a unique opportunity to bring this type of world to life through how we educate.

This booklet has been developed to assist teachers and curriculum designers to integrate a justice and peace perspective across the mathematics key learning area. It aims to:

- promote an understanding of how the Charter for Catholic Schools in the Edmund Rice Tradition can animate current mathematics teaching and learning
- explore what is meant by educating for justice and peace
- show how justice and peace themes and Catholic Social Teachings can contribute to the teaching and understanding of mathematics
- provide ideas about possible lessons, units and activities that can be developed for the classroom
- provide a list of relevant resources for the mathematics educator

This resource aims to support the development of activities and units that are linked to state and national curriculum goals. It can be used in the following ways:

- as a starting point for exploring how to integrate justice and peace themes in lessons and units
- as a formation resource for use by heads of department and curriculum leaders in assisting educators to understand the Charter for Catholic Schools in the Edmund Rice Tradition
- as a planning tool in the development of a whole school approach to justice and peace education



The Close the Gap campaign aims to improve Indigenous health in Australia. Through exploring statistics of Indigenous health, students in the mathematics classroom become aware of inequalities present in Australia. This can lead to positive action for change.

Photo Credit: Close the Gap Coalition



“I thought maths was just a subject they implanted on us just because they felt like it, but now I realise that you could use math to defend your rights and realise the injustices around you...Now I think maths is truly necessary and, I have to admit it, kinda cool. It's sort of like a pass you could use to try and make the world a better place.”

– Frieda, Grade 9¹

Photo Credit: St Edmund's College

Why educate for justice and peace?

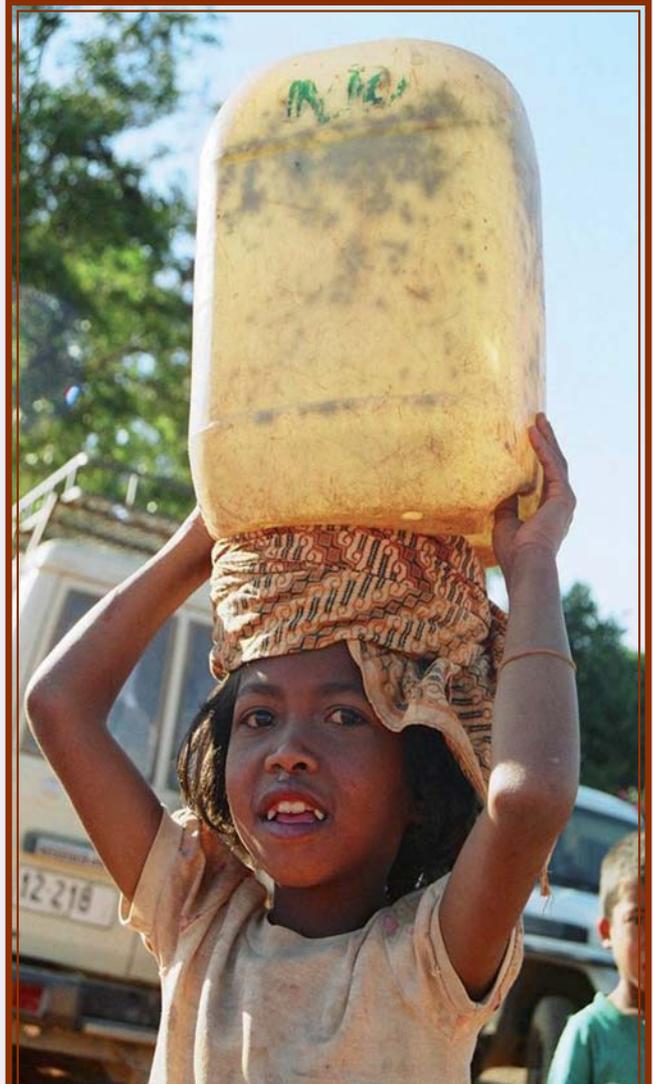
“Let us not develop an education that creates in the mind of the student a hope of becoming rich and having the power to dominate. That does not correspond to the time we live in. Let us form in the heart of the child and the young person the lofty ideal of loving, of preparing oneself to serve and to give oneself to others. Anything else would be education for selfishness.” Archbishop Oscar Romero ²

The world that young people live in today is characterised by an increasing gap between rich and poor and more than a billion people living on less than \$1 a day. Over thirty thousand children die each day from preventable diseases and the world loses thousands of animal and plant species each year. The current consumption of the world’s resources is unsustainable and war affects the lives of millions of people. Indigenous peoples from across the world are increasingly being marginalised and traditional languages and knowledge is being lost at a remarkable rate. This is the reality of our world today. Yet within and between these problems are numerous signs of hope....people gathering together, taking risks, to genuinely make a difference.

Our world of today requires passionate visionaries who are not only aware of the structures and institutions that prevent all people from being fully human, but who also have the knowledge, skills and attitudes to vision and act for a better world.

Education is one of the most powerful tools that we can use to change the world. Educating for justice and peace provides the leaders of tomorrow with the opportunity to engage with these issues and explore ways to overcome them in a safe and supportive environment. It allows students to:

- open their minds and hearts to the reality of the world;
- acknowledge their own role in society and the interrelationships with the local, national and global environments;
- celebrate the rich diversity, viewpoints and cultures of the world and explore the common humanity that underpins these;
- develop critical thinking about important issues
- stand in solidarity with those on the margins of society through the development of relationships
- develop the necessary skills required to action a better world



In East Timor, the majority of the population lives on less than \$1 a day. The mathematics curriculum provides the space for students to explore these statistics and become aware of the issues facing our neighbours. This learning can link with twinning relationships between schools from Australia and East Timor.

Photo Credit: Comunidade Edmund Rice

Underpinning this is the development of a spirituality that calls forth in young people the desire to act and serve for a better world. When a community such as a Catholic school develops curricula steeped in the ethos of the Gospel and the justice and peace teachings of the Church and places this curriculum before students in the context of practical day to day service, then a vital door to deeper spirituality opens. Young people are doers. Young people want to make a difference. Young people want to be part of an exciting venture and want to do ‘justice’ with and for others.

When young people in Catholic schools are invited into justice and peace programs wrapped in a visionary Gospel ideology and partake of regular and guided reflection upon their experience and this reflection

is linked to the Gospel they will grow in faith. These experiences become a bridge between daily life and faith, between their idealism and faith, between their critical sense of their world and a living faith. Walking with students through this process is an exciting challenge for educators.

The Christian Brothers and Edmund Rice Education have accepted this challenge and clearly mandated that Catholic Schools in the Edmund Rice Tradition, staying true to their founding vision, must educate for justice and peace. The 2002 Chapter of the Christian Brothers set out a vision for all schools to be: *communities of learning and faith and justice, where students, parents and staffs are educated to a practical awareness of social inequality.*³

The Charter for Catholic Schools in the Edmund Rice Tradition clearly articulates that the: *curriculum and activities of the school enable students to experience and value a critical awareness of social justice issues and that the school provides opportunities for each member to be active in identifying and alleviating forms of injustice in and beyond the school community.*⁴

The very nature of this approach to education is clearly fraught with many difficulties, yet as Br Philip Pinto, the Congregational Leader of the Christian Brothers passionately states:

*"We have to stand up and be counted. It is a dangerous business: it is an unfashionable career. We will be accused of rocking the boat and subverting the system.....We will be accused of being crazy. But to people of vision it is life giving. I invite you today to translate this into reality."*⁵



Mathematics allows students to value Aboriginal and Torres Strait Islander culture through exploring symbols and patterns in art.

Photo Credit: Edmund Rice Family, Murgon

Reconciliation in Action

Aboriginal and Torres Strait Islander Perspectives in Mathematics

Including Aboriginal and Torres Strait Islander perspectives in the curriculum ensures that the histories, cultures, values, beliefs and languages of the first peoples of Australia are actively learnt and understood. It also highlights the positive contributions, both historically and in the present day, that Aboriginal and Torres Strait Islander people have made to Australia.

In mathematics, learning activities can:

- explore the nature of Indigenous counting systems and how they vary in line with physical and social needs
- examine how Indigenous knowledge of the relationships between seasons, directions, temperature and the sun enhances spatial awareness
- explore how traditional Indigenous technology and innovation depend on perceived needs, available materials and socio-cultural contexts
- investigate how games lead to the development of culturally important mathematical skills
- work with Indigenous professionals who use mathematics in their professions
- use time lines that include significant events in the freedom struggle of Indigenous people eg: 1967 referendum, Freedom rides, Mabo judgement
- explore symbols and patterns in contemporary Indigenous art

Adapted from ACT ATSI Across Curriculum Perspectives⁶

The Charter and Educating for Justice

The Charter for Catholic Schools in the Edmund Rice Tradition provides the inspiration for education in Edmund Rice Schools in the 21st Century. The following table illustrates how the cultural characteristics can provide a focus and underpinning for a justice and peace education.

STEWARDSHIP

In the Catholic tradition we are called to manage and use resources equitably in the best interests of current and future local and global communities.

Through educating for justice and peace, the curriculum demonstrates respect for and care of the earth through its practices and teachings, acknowledges the traditional relationship of indigenous peoples with the land, and ensures that resources are shared justly and used wisely. Curriculum activities highlight the continuing contribution of the Christian Brothers to building a better world.

PASTORAL CARE

Recognising the dignity of each and every person is foundational to building a just and peaceful world and is at the heart of Pastoral Care.

Through educating for justice and peace, the curriculum is sensitive to the needs of each student and to the common good providing experiences to empower each person to embrace the fullness of life.

BEING JUST

In the Catholic tradition, seeking justice for the betterment of our society is integral to the foundational vision of building the Kingdom.

Through educating for justice and peace, the curriculum enables community members to experience and value a critical awareness of social justice issues. Through the provision of opportunities for active participation in identifying and alleviating forms of injustice in and beyond the school community, the curriculum leads students to feel empowered to act for a better world.

SPIRITUALITY

In the Catholic tradition, the motivating inspiration to build a better world comes from a deep relationship with God and recognition that each person's story is unique and sacred.

Through educating for justice and peace, the curriculum of the school nurtures the spiritual life of students and recognizes that its growth is a fundamental outcome of quality teaching and learning.

COMPASSION

Compassion is central to the life and teaching of Jesus and to the spirituality of Edmund Rice.

Through educating for justice and peace, curriculum learning activities nurture both the hearts and minds of students, and leads them to respond to injustice with compassion. The curriculum models the Gospel's values of forgiveness and reconciliation when dealing with situations of conflict, and assists and empowers at-risk students to participate fully in the community.

AT THE MARGINS

We are all called to follow in the footsteps of Jesus and Edmund Rice by standing in solidarity with those who are powerless and marginalised.

Through educating for justice and peace, the curriculum highlights the contributions of those who are marginalised in our world through the selection of resources and the promotion of diversity. As an expression of standing in solidarity with others, the curriculum is organised to ensure that the marginalised have full access to learning opportunities enabling all to participate with dignity and confidence.

EDMUND RICE EDUCATION AUSTRALIA



THE CHARTER

A PROCLAMATION OF AN AUTHENTIC
EXPRESSION OF
EDMUND RICE EDUCATION
AS APPLIED TO
CATHOLIC SCHOOLS IN THE EDMUND RICE TRADITION

One of a series of core documents prepared by
The National Planning Committee for Schools Governance
Christian Brothers Australia

HOLISTIC EDUCATION

Holistic Education calls us to provide relevant, authentic, dynamic and creative teaching and learning experiences that promote the development of the whole person.

Through educating for justice and peace, teaching and learning experiences aim to provide an understanding of local and global justice issues and action for individual and societal transformation.

Mathematics: Making Sense of Our World

COMMUNITY

Community culture is developed when the personal relationships of its members evidence respect, hospitality, nurture, humour, care and justice.

Through educating for justice and peace, the curriculum is responsive to the gift and journey of each person and provides many and varied opportunities for connecting with families, local and global communities.



Mathematics is a global activity that impacts on the lives of all people and has profound ethical and social dimensions.



It has the power to enable us to understand global issues and develop new and revolutionary ways of solving some of humanity's greatest problems. Without mathematics we could not understand our world or what is happening in it. Nor could we work out systems that are impartial, accurate and just, such as; the calculation of fair wages, the measurement of illiteracy, poverty and mortality, the reduction of waste, analysis of world population growth and numerous other issues. Mathematics is an integral part of any endeavor to create a better world.

SERVICE OF OTHERS

As an expression of Christianity, all are called to be active in the service of others based on a Gospel model of service centred in communion with others.

Through educating for justice and peace, the curriculum incorporates service opportunities as a valid approach to learning by actively teaching the skills of service. The curriculum assists students to gain an understanding of service as a movement from charity to justice.



Famous mathematicians such as George Poyla (1887-1985) and Imre Lakotas (1933-1974) maintained that 'moral qualities' such as intellectual courage, intellectual honesty and wise restraint were essential to coming to know and to do good mathematics. However, the use of mathematics has, at times, contributed greatly to the breakdown of human relationships, life and the environment. Current mathematical research (eg coding theory) is undertaken by military technology research industries. Young people need to be aware that good mathematics is a communal activity influenced by moral commitments.

REFLECTIVE PRACTICE

Reflective practice promotes the transformation that enables individual and community growth through the provision of formation opportunities for community members in the Spirit of Christ, the charism of Blessed Edmund Rice, their own sacred story and their call to mission.

Through educating for justice and peace, the curriculum incorporates reflective practice to enable each person to reflect on the contemporary world in the light of the Gospel, and to accept responsibility and be accountable for their actions leading to personal and communal growth.



What then, is our role as mathematics teachers in a world where mathematics plays such a pivotal role? Our primary role is to encourage the qualities of rigour, accuracy and creativity which are the hallmarks of good mathematical practice. However, as teachers in Edmund Rice schools, we must also strive to educate young people who are committed to bettering the world in which they live. Mathematics education allows us the opportunity to do this.

FAITH IN ACTION

In the Catholic tradition we are called to express our faith as prophetic action in the world.

Through educating for justice and peace, the curriculum provides opportunities for students to gain knowledge, and develop skills so they can respond to issues of injustice out of a personal relationship with God.

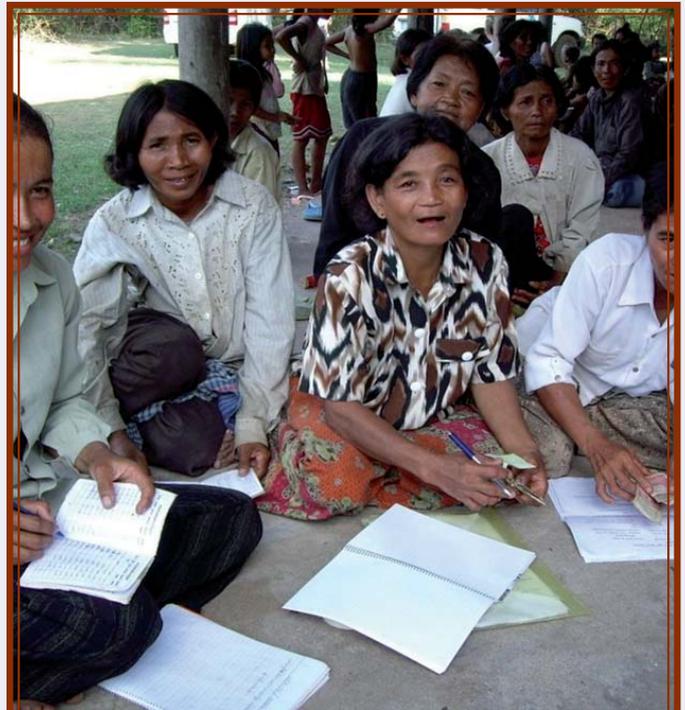


A mathematics curriculum of justice and peace can:

- highlight the contribution of people from the Global South to the development of mathematical thought and processes
- incorporate real life examples of justice and peace topics into lessons to focus the attention of students to the state of the world eg: HIV/Aids, wealth distribution statistics
- organise collaborative projects with schools from different socio-economic and cultural backgrounds to work on maths problems
- link academic maths work with service and solidarity programs eg: community gardens and street vans
- highlight the contribution that mathematics makes to the wider community through its use in organisations eg: medical research institutes, aid and development organisations
- celebrate cultural diversity through exploring maths from different cultures
- promoting mathematical success for students from marginalised backgrounds

These approaches not only promote meaningful classroom practice, they encourage and motivate students to:

- recognise the power of mathematics as an essential analytical tool to understand and potentially change the world, rather than merely as a set of procedures and rules
- deepen their understanding of important social issues, such as environmental change, epidemiology (the study of diseases), population issues etc.
- understand their own power to be active citizens in building a global society characterised by justice and peace for all people



A micro-credit savings scheme in Cambodia, supported by Caritas Australia. Exploring income generation schemes like these through mathematics helps students to develop global solidarity and understand lifestyles of people in the majority world

Photo Credit: Caritas Australia

The overall goal is to broaden students' understanding of justice and peace issues in a mathematical context, without compromising the integrity of the mathematics involved. As mathematics teachers, we would never agree to changes which diminish the intrinsic value of mathematics. We can, however, greatly enhance its moral dimension by incorporating compassionate perspectives into our curriculum.

A Framework for Educating for Justice and Peace

“Being able to imagine a world in which there is peace, justice and equity and opportunity for all to achieve their full potential is the basis of being an active global citizen” Development Education Association⁷

When educating for justice and peace, teachers often ask, “Where do I start?” and “What do I focus on?” The following key concepts provide a conceptual framework for thinking about and understanding justice and peace issues and building it into the curriculum.

These concepts are divided into two main areas: the themes of justice and peace education and the faith responses. The key themes present a holistic approach to understanding justice and peace issues and the faith responses illustrate a Christian response. They provide the “lens” in to how historical, present and future issues and concerns can be viewed. Each of the concepts are interrelated and it is important that connections are illustrated between them. The key concepts have been developed to assist teachers in the planning and evaluation process. It would be envisaged that each of these concepts are incorporated across the curriculum so that throughout their schooling, students are exposed to them all.

The eight themes provide a framework within which to understand the issues of justice and peace. They can be used as ‘lens’ to explore issues that are presented in real world circumstances. These concepts illustrate the breadth and depth of educating for justice and peace.

The six faith responses of Catholic Social Teachings provide a theological framework for curriculum infusion and integration. Drawn from the scripture and the lived experience of the church over time, these faith responses provide a roadmap for building a world community of justice, peace and compassion.

Approaches to Justice and Peace Education

Head

Reading the Signs of the Times

Learning activities that assist students to become aware of:

- their own giftedness
- injustices in the world and how they can respond
- prophetic people who are making a difference

Heart

Nurturing Gospel Compassion

Learning activities that:

- nurture concern and compassion for those affected by injustices in the world
- provide opportunities for relationship building with those on the margins of society

Hand

Undertaking Prophetic Action

Learning activities that :

- provide opportunities for students to be serve their local and global communities
- use their academic learning in real-life situations for the benefit of others

Global Citizenship

Gaining the knowledge, skills and understanding of concepts and institutions necessary to become informed, active, responsible citizens.

- developing skills to evaluate information and different points of view on global issues through the media and other sources
- learning about institutions, declarations and conventions and the role of the Church, NGOs and governments in global issues
- developing understanding of how and where key decisions are made
- appreciating the global context of local and national issues and decisions at a personal and societal level
- understanding the roles of language, place, arts, religion in own and others' identity

Interdependence

Understanding how people, places, economies and environments are all inextricably interrelated, and that choices and events have repercussions on a global scale.

- understanding the impact of globalisation and that choices made have consequences at different levels, from personal to global
- appreciating the links between the lives of others and children's and young people's own lives
- understanding the influence that diverse cultures and ideas (political, social, religious, economic, legal, technological and scientific) have on each other and appreciating the complexity of interdependence
- understanding how the world is a global community and what it means to be a citizen
- understanding how actions, choices and decisions taken in Australia can impact positively or negatively on the quality of life of people in other countries

Faith Responses Catholic Social Teachings

The Common Good

Working towards the just sharing of resources that benefits the needs and hopes of all groups in society

Framework for Education

Option for the Poor

Seeing the world through the eyes of the poor and marginalised and standing with them in active solidarity for justice

Solidarity

Standing with the poor and marginalised to empower each other to remove unjust barriers to a more human life

Diversity

Understanding and respecting differences and relating these to our common humanity.

- appreciating similarities and differences around the world in the context of universal human rights
- understanding the importance of respecting differences in culture, customs and traditions and how societies are organised and governed
- developing a sense of awe at the variety of peoples and environments around the world
- valuing biodiversity
- appreciating diverse perspectives on global issues and how identities affect opinions and perspectives
- understanding the nature of prejudice and discrimination and how they can be challenged and combated

Social Justice

Understanding the importance of social justice as an element in both sustainable development and the improved welfare of all people.

- valuing social justice and understanding the importance of it for ensuring equality, justice and fairness for all within and between societies
- recognising the impact of unequal power and access to resources
- developing the motivation and commitment to take action that will contribute to a more just world
- challenging racism and other forms of discrimination, inequality and injustice
- understanding how past injustices affect contemporary local and global politics

Conflict Resolution

Understanding the nature of conflicts, their impact on development and why there is a need for their resolution and the promotion of harmony.

- knowing about different examples of conflict locally, nationally and internationally and different ways to resolve them
- understanding that there are choices and consequences for others in conflict situations
- understanding the importance of dialogue, tolerance, respect and empathy
- developing skills of communication, advocacy, negotiation, compromise and collaboration

Sustainable Development

Understanding the need to maintain and improve the quality of life now without damaging the planet for future generations

- recognising that some of the earth's resources are finite and therefore must be used responsibly by each of us
- understanding the interconnections between the social, economic and environmental spheres
- considering probable and preferable futures and how to achieve the latter
- appreciating that economic development is only one aspect of quality of life
- understanding that exclusion and inequality hinder sustainable development for all
- appreciating the importance of sustainable resource use and obtaining materials from sustainably managed sources

Subsidiarity

Supporting the decision making actions of local groups and people

Integrity of Creation

Recognising that we are stewards and co-creators of creation through respecting and caring for the natural world now and for future generations

g for Justice and Peace

Dignity of the Human Person

Defending the inalienable rights of all human beings as made in the image of God

Cultivating Peace

Nurturing a reflective and spiritual approach to life that leads to transforming action in the world

Human Rights

Knowing about and understanding human rights.

- valuing our common humanity and the meaning of universal human rights
- understanding rights and responsibilities in a global context and the interrelationship between the global and the local
- understanding that there are competing rights and responsibilities in different situations and knowing some ways in which human rights are being denied and claimed locally and globally
- understanding human rights as a framework for challenging inequalities and prejudice such as racism

Values and Perceptions

Developing a critical evaluation of representations of global issues and an appreciation of the effect these have on people's attitudes and values.

- understanding that people have different values, attitudes and perceptions
- developing multiple perspectives and new ways of seeing events, issues, problems and opinions
- questioning and challenging assumptions and perceptions
- understanding the power of the media in influencing perceptions, choices and lifestyles
- understanding that the values people hold shape their actions

Adapted from DEA, 2000⁸

How do we teach from a justice and peace perspective?

The following strategies and process can be used to take a head, heart and hand approach to mathematics education.

Infusion method

The infusion method allows educators to relate a particular justice and peace concept to existing mathematics curriculum outcomes. The process involves:

1. **Look** at the desired outcomes of the lesson/unit as required by the syllabus
2. **Observe** the learning activities that are to be undertaken
3. **Choose** a related justice and peace concept that you want to introduce/reinforce
4. **Expand** the lesson/unit to include analysis and reflection of the concept and an opportunity to put the learning into action

Promoting mathematics to all students

Specific programs that encourage mathematical success for students from marginalised backgrounds are a vital component of justice and peace education. The Algebra Project (www.algebra.org) promotes mathematical achievement for disadvantaged young people, particularly through a conscientisation towards social issues.

Issues based approach

A thematic approach to mathematics education wraps the learning of mathematics around a particular focus area of justice and peace. This can be undertaken as a collaborative project with other subject areas, especially in the middle school.

Service and solidarity learning

Through serving in the community, students have the opportunity to link their academic learning with making a difference to others and the environment.

Highlighting contributions from minority groups and people from the south

Rather than just focusing on euro-centric contributors to mathematical development, students can be introduced to mathematical thinkers and ideas from a variety of different places in the globe. This breaks down perceptions of superiority and engages students with the global community.

Student's experience

By connecting mathematical activities to issues that students are concerned about and/or are affecting them, motivation and commitment increases. Extending these activities to show how mathematics can be

used to make a difference in the world helps to harness their interest in and commitment to justice and peace.

Collaborative cross-cultural learning

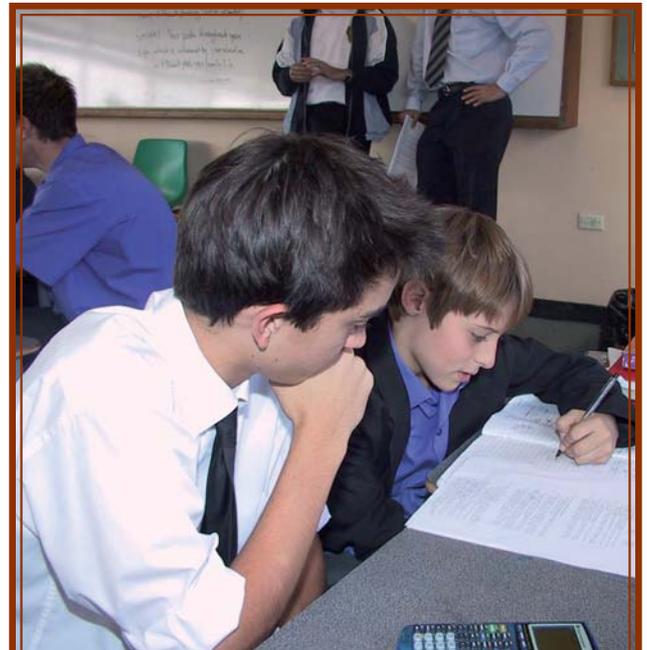
As a way of celebrating cultural solidarity, classes can link with global schools and collaboratively work on mathematics based activities together. A maths class from Australia could link with a class in the Philippines and collaboratively work on a maths problem each month.

Partnering with community organisations

Throughout the community, organisations are using mathematics to understand and solve some of the pressing issues that are facing our world today. These include research institutes who are exploring cures for disease, business' exploring sustainable practices and aid organisations providing support in times of crisis.

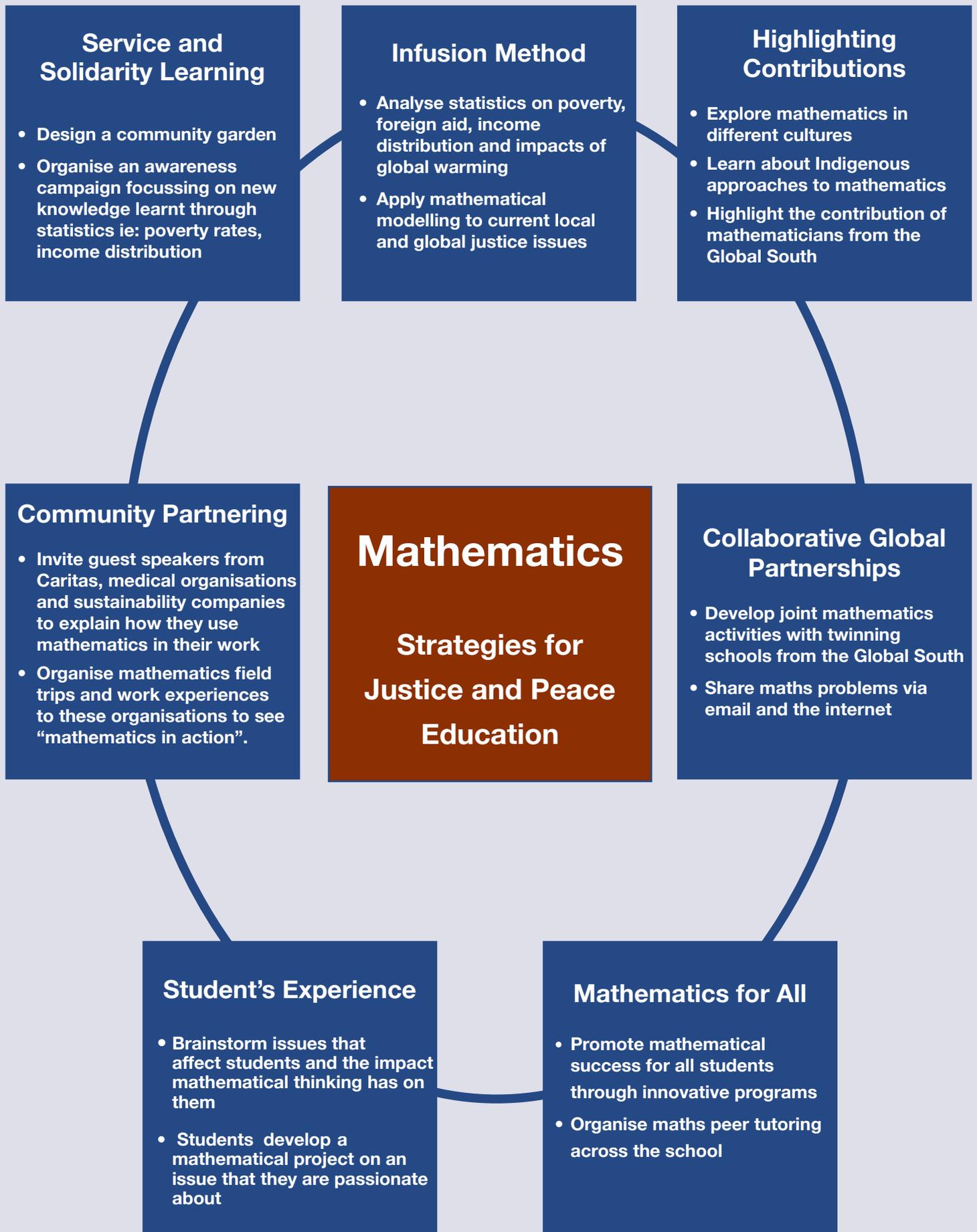
Promoting mathematical careers for justice and peace

Specific units could link with and/or highlight this work so students can see how mathematics can be used to transform society. This also presents pathways for students who are interested in pursuing a mathematics based career.



Students involved in mathematical service and solidarity learning through tutoring younger children. This reinforces academic learning and develops a sense of service among students.

Photo Credit: St Laurence's College



Learning Activities



Child labour is still used in the manufacture of sporting balls used by schools across Australia. Etiko is a company that campaigns against the use of children in producing these balls and supports community development by selling fair-trade products. Mathematical activities using these products can be developed in the number and space strand.

Photo Credit: Etiko Sports

“I was left with a powerful lesson. Through this activity I realised that those parallel pursuits could serve one another-where mathematical learning goals, even on a high level such as AP calculus, could be pursued at the same time as goals aimed at personal growth and social awareness.”

Megan Staples, Integrals and Equity.⁹

This section highlights a variety of activities that link the teaching of mathematics to an education for justice and peace. These ideas have been developed based on classroom practice occurring in schools around the world.

These activities are intended to be a starting point for educators, rather than a set of prescribed activities. They can be adapted and refined to suit the local context and used as part of a lesson or as the underlying theme for a unit.

We hope these ideas will assist and inspire teachers to develop lessons and units based on the liberating vision of the Charter and the desire to create a more just and peaceful world.



Student's from St Edmund's College and St Joseph's Gregory Terrace learning about the devastating effects of HIV/Aids in Africa. Students in mathematics classes in Brisbane have explored HIV/Aids statistics and heard stories of the human impact of this disease. Schools have become involved with awareness raising and advocacy efforts in support of people affected.

Photo Credit: Edmund Rice Education Australia

Middle School Activities

LEARNING ACTIVITIES		Justice and Peace Themes and Catholic Social Teachings		RESOURCES
STRAND	Number	<ul style="list-style-type: none"> Students explore number systems from different cultures, with a focus on mathematical systems from the majority world Students engage mathematically with these systems by exploring multiples, addition, subtraction and multiplication As part of a cultural festival, students prepare a stall highlighting these number systems and develop board games that use them Students could also connect with people from these cultures and explore similarities and differences in approaches to mathematics 	Diversity Solidarity	Human Rights in the Curriculum: Mathematics pg 10 (Work sheet provided) Aboriginal and Torres Strait Islander Mathematics www1.aiatsis.gov.au/exhibitions/ethnomathematics/ethno-contents.htm
	Number	<ul style="list-style-type: none"> Students graph government spending in a variety of areas (defence, education, health). Discuss what these figures tell us about our current system. Use defence spending as an opportunity to discuss large numbers (billions etc) 	Cultivating Peace Conflict Resolution	Math that Matters pg. 162
	Patterns and Algebra & Space	<ul style="list-style-type: none"> Use social justice examples in algebra word problems. eg. "Write an equation to represent the following situation, then solve the equation: Young children are paid the equivalent of 31c an hour to make soccer balls in Pakistan. How many hours would it take for these children to earn the Australian minimum hourly wage of \$12.15 per hour?" Link with an organisation selling fair-trade soccer balls ie: Etiko Sports. Design a pentagonally shaped social justice patch that could be stitched into the hide of a fair-trade soccer ball 	The Common Good Option for the Poor	www.etiko.com.au
	Measurement	<ul style="list-style-type: none"> Students explore the limited access to water faced by young people in the majority world. Through measuring their own bath and shower water, student's compare the use of water in Australia with water use in the developing world. Use this as an opportunity to discuss large numbers and SI units (eg 105 ML = 105 Million Litres) Through discussion and mathematical problem solving, students identify the difference between the use of water in different parts of the world and represent this mathematically. Students familiarise themselves with water saving techniques and the struggle many people face in accessing water each day. Students present these findings to the local paper in the form of a newspaper article that uses graphs, tables and charts. 	Option for the poor Integrity of creation Sustainable Development	Human Rights in the Curriculum: Mathematics pg 33 www.wateraid.org.uk
	Chance and Data	<ul style="list-style-type: none"> Students investigate statistical information comparing Indigenous and non-Indigenous Australians (life expectancy, income) and present evidence based arguments about the causes of this inequality. Students investigate distributions of world population and wealth and use graphical representations to demonstrate their arguments. Students can reflect on and discuss the causes of any inequality found. Students construct pie charts showing the division of the cost of expensive goods to highlight the inequality inherent in the production of many consumer goods. Sectors of the chart would relate to profit, wages, government taxes, etc 	The Common Good Option for the Poor Social Justice	Close the Gap Campaign www.oxfam.org.au/campaigns/indigenous-health/ Math that Matters (Various activities)
	Space	<ul style="list-style-type: none"> Students compare different projections of world maps (eg Peters projection vs Mercator projection) to investigate social and cultural biases inherent in different projections. 	Interdependence	Seeing Through Maps: The Power of Images to Shape our World
	Working Mathematically	<ul style="list-style-type: none"> Students design mathematics challenges, with a justice focus, that can be accessed by younger students at various Maths Challenges (eg Gold Coast Mathematics Modelling Challenge). This Challenge is held over 2 days and requires students to work in groups of 4 on a specific Year Level relevant challenge. It provides a forum to link awareness raising for just causes with mathematical work. 	Social Justice	

Upper School Activities

STRAND		LEARNING ACTIVITIES		Justice and Peace Themes and Catholic Social Teachings		RESOURCES	
Maths A							
Managing Money	<ul style="list-style-type: none"> Invite a guest speaker to share their experiences of living on less than a dollar a day survive on \$1 a day?' Students discuss a budget of a lowly paid worker in the majority world. Eg "how do you survive on \$1 a day?' Students explore micro-credit facilities for a low paid workers in the majority world. Calculate a budget as well as interest repayments required. Explore the work of Muhammad Yunus and the Grameen Bank. 	Dignity of the Human Person Option for the Poor Human Rights	Micro Finance www.globaleducation.edna.edu.au Grameen Bank www.nobelprize.org Living on \$1 a day www.bbc.co.uk/worldservice/documentaries/2007/12/071227_dollar_a_day_1.shtml				
Elements of Applied Geometry	<ul style="list-style-type: none"> Students design a ramp for wheelchair access somewhere around their own school. The use of trigonometry (angles of elevation and depression) and scale are stressed. 	Dignity of the Human Person Human rights					
Data collection and presentation	<ul style="list-style-type: none"> Students compare statistical information comparing Indigenous and non-Indigenous Australians (life expectancy, income) and discuss causes of this inequality. Students investigate distributions of world population and wealth and use graphical representations to demonstrate their findings. Discuss the causes of any inequality found providing reasons it might exist. 	Human rights Option for the Poor	Close the Gap Campaign www.oxfam.org.au/campaigns/indigenous-health/ World Mapper www.worldmapper.org				
Land Measurement	<ul style="list-style-type: none"> Students compare different projections of world maps (eg Peters projection vs Mercator projection) to investigate biases inherent in different projections. The use of scale as well as SI units of measurement is essential. 	Interdependence	Human Rights in the Curriculum: Mathematics pg 36				
Maths B/C							
Integration	<ul style="list-style-type: none"> Students use lorenz curves and the gini coefficient to explore income inequality within Australia and around the world and changes over time Students publish this data in the school newsletter and combine it with stories of people who are affected 	Option for the Poor Solidarity	Human Rights in the Curriculum: Mathematics pg 76 Stories; www.caritas.org.au				
Applied statistical analysis	<ul style="list-style-type: none"> Link maths classes with school based service programs. eg: If students are involved in supporting the homeless, investigate homelessness, how data is collected and what it reveals. Infuse justice and peace topics into statistical problems. eg "The probability of low birth weight in Australia is 6%. Of babies born in indigenous communities in Queensland, (x) had low birth weight. Use statistical measures to determine whether Indigenous children are more likely to be born underweight". Discuss causes of low birth weight with reference to Indigenous health. Discuss ways statistics could be used to highlight these injustices and used to solve them. 	Social Justice Option for the Poor	Youth Homelessness Australia www.nyc.net.au/ Close the Gap Campaign www.oxfam.org.au/campaigns/indigenous-health/				
Periodic functions and applications	<ul style="list-style-type: none"> Students investigate long term periodic changes in temperature/ CO2 levels. Students prepare a power point for assembly that uses mathematics to explain changes, explains consequences and offers solutions. 	Sustainable Development Integrity of Creation					
Optimisation using derivatives	<ul style="list-style-type: none"> Use justice and peace examples for optimisation problems. eg "During the course of an epidemic, the proportion of the population infected months after the epidemic began is given by..... Find the maximum proportion of the population that becomes infected." Discuss the spread of disease under poor hygiene conditions. 	Social Justice Option for the Poor					
Exponential and logarithmic functions	<ul style="list-style-type: none"> Students investigate world population growth using exponential models. They then extrapolate and discuss implications of their models. Students investigate the difficulties associated with home purchasing for low wage earners in the context of annuities. 	Social Justice Dignity of the Human Person	Rethinking Mathematics pg 55				
Working Mathematically	<ul style="list-style-type: none"> Students design mathematics challenges, with a justice focus, that can be accessed by peers at various Maths Challenges (eg Gold Coast Mathematics Modelling Challenge). This Challenge is held over 2 days and requires students to work in groups of 4 on a specific Year Level relevant challenge. It provides a forum to link awareness raising for just causes with mathematical work. 	Social Justice					

Putting Learning into Action

Service and Solidarity Learning

When students have the opportunity to use the knowledge and skills that they have learnt in the wider community, they begin to see the value of their academic learning. Research has shown that students who are involved in service activities are more engaged in learning, have fewer behaviour problems and have a higher sense of self-esteem and resilience.

Service and solidarity learning activities also provides a realistic approach to evaluating student outcomes. The application of their learning in a community context enables educators to authentically assess student learning.

Through Mathematics, students can organise a culminating activity for their academic learning that puts “theory into practice” These projects could include:

- initiating a community garden (space and number)
- measuring pollution levels in a local water catchment area and reporting finding to their local MP (measurement)
- designing furniture around the school that makes life easier for people with a disability (measurement, applied geometry)
- raising awareness through talks and publications of issues related to the study of statistics (eg: poverty, income distribution)
- tutoring of younger students in mathematics

Global Twinning Relationships

In a spirit of global solidarity, schools are increasingly connecting with communities from the “global south” through twinning relationships and immersion programs. These relationships provide a “real” foundation for engaging young people in justice and peace throughout the formal curriculum.

Through these partnerships, the mathematics teacher can:

- provide “real life” examples that have meaning for students ie: ethnomathematics, poverty, life expectancy
- exchange mathematical problems each week/ month with a twinning school
- collaboratively explore common issues with a mathematical lens



School to school partnerships provide powerful and exciting learning experiences for all involved. Mathematics classes can link with schools from the Majority world and explore common issues through a mathematical lens.

Photo Credit: South Africa/Australia Alive! EREA & Christian Brothers – Philippines

Where to from Here? Inviting Teachers into Action

The most important task of a curriculum leader is to inspire teachers to engage with justice and peace education. Educational leaders in an Edmund Rice School are called to collaboratively lead both structural change in the mathematics department and guide teachers towards developing and owning this change.

Listed below are some strategies that the curriculum leader can undertake to develop the justice and peace dimension of the Mathematics department.

Structural Aspects of Change

- Develop a team vision for a justice and peace focus in mathematics
- Identify existing practices and programs that promote a justice and peace focus
- Identify areas for development and strategically plan for their implementation
- Provide opportunities for professional development
- Allow time for planning and renovating of units

People Aspects of Change

- Offer formation opportunities for staff centering on a spirituality of justice and peace
- Invite staff to become involved in school service and solidarity programs that allows them to connect with those on the margins
- Work with and mentor individual staff on program development
- Invite experienced justice and peace educators to present “best practice” pedagogy
- Organise visits to other schools who have infused justice and peace across the curriculum
- Celebrate when new initiatives are implemented



Benefits for Teachers

Through their involvement in integrating justice and peace throughout the mathematics curriculum, teachers will:

- Create mathematics lessons that are dynamic, creative, relevant and interesting to teach
- Observe increased student motivation, commitment and achievement
- Expand their awareness about the world and the issues that people face
- Become actively involved in “Faith in Action” and through teaching grow in an engaged spirituality
- Have new opportunities to connect with other faculties, community organisations and people active in building a peaceful world
- Become aware of new career paths and employment opportunities

Photo Credit: Newstreet formation program, Edmund Rice Education Australia

Sustaining the Vision

A Spirituality for the Justice and Peace Educator

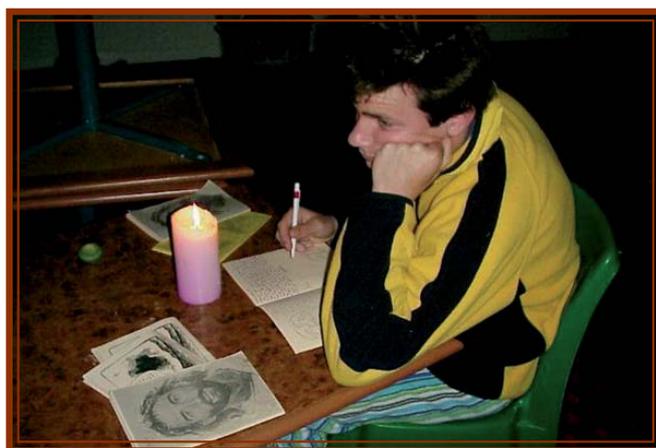
*God help us to change.
To change ourselves, and to change the world.
To know the need for it. To deal with the pain of it.
To feel the joy of it.
To undertake the journey without understanding the destination.
The art of gentle revolution.* Michael Leunig, A Common Prayer¹⁰

The essence of being an educator for justice and peace firstly begins with you as a person committing to the journey of building a better world. It is a commitment that requires you to take the time to nurture your own spirituality...through prayer, community building, service and study. Through these experiences you are

able to continually discern God's call to undertake the difficult, yet inspiring journey of helping young people see their potential as builders of a better world.

The following ideas are offered to help you in this exciting and worthwhile journey.

<p>Community</p> <ul style="list-style-type: none"> - Form supportive networks of like-minded educators - Seek out mentors - Share the journey with others in community - Practice non-violence and peace-building 	<p>Service</p> <ul style="list-style-type: none"> - Join advocacy organisations eg: St Vincent De Paul, Drop the Debt Campaigns - Commit some time to serving those on the margins of society each week - Undertake immersion programs to the majority world
<p>Prayer</p> <ul style="list-style-type: none"> - Take time out each day to nurture your relationship with God - Engage with the liberating message of the Gospel - Participate in a retreat each year - Undertake regular spiritual direction 	<p>Theology</p> <ul style="list-style-type: none"> - Learn about Catholic Social Teachings - Explore liberation and creation theologies - Undertake formal study in areas such as spirituality, religious education and theology



Resources

Books

Maththatmatters, by David Stocker (2007)

David Stocker has crafted 50 thoughtful and accessible lesson plans that explore the links between mathematics and social justice. This is an innovative and indispensable tool for those passionate about mathematics, social justice, civic engagement, and interactive and involved classrooms.

Human Rights in the Curriculum: Mathematics, by Amnesty International (2004)

This resource addresses human rights challenges present in our world today – through the lens of the mathematics classroom. It provides 30 thought-provoking, entertaining and multicultural activities for all areas of the math's curriculum.

Rethinking Mathematics: Teaching Social Justice by the Numbers, by Eric Gutstein & Bob Peterson (2006)

A unique collection of over 30 articles that show how to weave social justice issues throughout the mathematics curriculum. Rethinking Mathematics offers teaching ideas, lesson plans, and reflections by practitioners and mathematics educators. It will deepen students' understanding of society and help prepare them to be critical, active participants in a democracy.

Math for a World that Rocks by Kevin J. Mistrik and Robert C. Thul (1997)

Written and illustrated by students based on "Math for a Change." Covers 23 social justice projects with topics such as rain forests and strip mining

The Multicultural Math Classroom: Bringing in the World, by Claudia Zaslavsky (1996)

A multicultural perspective for elementary and middle school teachers, including teaching ideas on number systems, counting, calculating, geometry, and data analysis

More Math Games and Activities from Around the World by Claudia Zaslavsky (2003)

A compilation of 70 games, puzzles, and projects from around the world that help students become interested in and learn math while giving them a greater appreciation for the role of math in many countries.

Multicultural Mathematics: Teaching Mathematics from a Global Perspective by David Nelson, George Gheverghese, Joseph, and Julian Williams (1993)

This is an excellent resource that presents a rationale for teaching mathematics with a multicultural and global perspective and provides many examples that teachers can learn from.

General Justice and Peace Resources

Global Perspectives: A Statement on Global Education for Australian Schools, by the Curriculum Corporation (2004)

An overview of how to infuse global education throughout both curriculum areas and other areas of school life.

Education for International Understanding Towards a Culture of Peace: A Conceptual Framework by SW Toh (2002)

Math and Science Across Cultures, by Maurice Bazin and Modesto Tamez (2002)

A unique collection of activities and lessons on how math is integrated into work and play in different cultures. Lessons include Madagascar Solitaire, The Inca Counting System, and Math in Ancient Egypt.

Teaching Economics as if People Mattered, by Tamara Sober Giecek (2000)

A teacher-friendly guide, full of reproducible graphics and specific teacher lessons on a range of important economic issues including income distribution, wages and salaries of workers and CEOs, globalization and more. High school and above, although some of the charts and activities could be modified for middle school and upper elementary.

The No-Nonsense Guide to World Poverty, by Jeremy Seabrook (2003)

A handbook packed with facts, vignettes, and essays on the roots, scope, and impact of world poverty. An excellent resource for high school social studies and math teachers.

Seeing Through Maps: The Power of Images to Shape Our World, by Ward L. Kaiser and Denis Wood View (2001).

An excellent resource for understanding how maps are created and some of the mathematical issues involved. This book helps us see how maps shape our view of ourselves and others, and examines issues in various world maps (e.g., the Peters and Mercator projections)

Catholic Social Teachings

Opting for the Poor, by Fr Peter Henriot (2004)

An engaging and inspirational book that explores the Church's teachings on justice and peace and proposes practical ways people in the west can respond.

Globalization, Spirituality and Justice, by Fr Daniel Groody

This book explores the state of the world in the 21st Century and the need for Christian's

to respond to issues of justice and peace. It is an excellent resource for understanding how faith and the needs of the world intersect.

Websites

Aboriginal and Torres Strait Islander Mathematics

www1.aiatsis.gov.au/exhibitions/ethnomathematics/ethno_contents.htm

Women Mathematicians

www.agnesscott.edu/lriddle/women/women.htm

Radical Math

www.radicalmath.org
This website provides over 700 lesson plans, articles, charts, graphs, data sets, maps, books and websites for use by teachers of mathematics

The Algebra Project

www.algebra.org
The Algebra Project works for access to higher level math classes for all people, particularly African Americans.

Statistics

United Nations:

unstats.un.org/unsd/

World Bank:

www.worldbank.org/data/

UNESCO:

www.uis.unesco.org

Joint UN Programme on HIV/AIDS: www.unaids.org

UN Millennium Development Goals: unstats.un.org/unsd/mi/mi_goals.asp

Thanks to Rethinking Mathematics for resource ideas and suggestions

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