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A MULTI-DISCIPLINARY AND INQUIRY-BASED LEARNING ACTIVITY: THE SEVEN CONTINENTS[1]

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ABSTRACT

This study introduces a learning activity that was designed based on two student-centered approaches to education: inquiry-based learning and multi-disciplinary education. Twenty-four second grade students participated in the study. The activity integrates geography, English, and technology and offers students opportunities for inquiry-based thinking. The goal of the activity is for students to find out what the seven continents are, where they are in the world, and create their own little maps. The students collaboratively explore world maps both in hand and on the interactive board. The extension activity is the area of differentiation and acts as differentiation by outcome. Data analysis revealed that all students met the learning goals. The main area for improvement on this would be to have the students mark their work by looking at a real map of the world instead of a completed version of their worksheet; this would make the assessment more authentic.
Keywords: multi-disciplinary education, active learning, collaboration, inquiry-based learning, primary education.

DİSİPLİNLERARASI VE SORGULAMA TEMELLİ BİR ÖĞRENME ETKİNLİĞİ: YEDİ KITA

ÖZ

Bu çalışma, eğitime yönelik iki öğrenci merkezli yaklaşıma dayalı olarak tasarlanmış bir öğrenme etkinliğini ortaya koymaktadır: sorgulamaya dayalı öğrenme ve disiplinlerarası eğitim. Araştırmaya 24 tane ikinci sınıf öğrencisi katılmıştır. Etkinlik; coğrafya, İngilizce ve teknoloji derslerini bütünleştirmekte ve öğrencilere sorgulamaya dayalı düşünme fırsatları sunmaktadır. Etkinliğin amaçları öğrencilerin yedi kıtanın ne olduğunu, dünyanın neresinde olduklarını öğrenmeleri ve kendi küçük haritalarını oluşturmalarıdır. Etkinlik kapsamında, öğrenciler dünya haritasını hem fiziksel olarak hem de akıllı tahtada dijital olarak birlikte keşfetmektedirler. Farklılaştırma eğitimi anlayışıyla uyumlu olarak etkinlik sonunda farklı ürünler ortaya koyma seçeneği sunulmaktadır. Veri analizi, tüm öğrencilerin öğrenme hedeflerine ulaştığını ortaya koymuştur. Uygulamada iyileştirilmesi gereken esas alan, öğrencilerin çalışma sayfalarının tamamlanmış bir versiyonu yerine gerçek bir dünya haritasına bakarak çalışmalarını değerlendirmeleri olacaktır; bu revizyonun, değerlendirme sürecini daha gerçekçi bir hale getireceği düşünülmektedir.
Anahtar kelimeler: disiplinlerarası eğitim, aktif öğrenme, işbirlikli öğrenme, sorgulama temelli öğrenme, ilköğretim.

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INTRODUCTION

There is a multiplicity of approaches to education. One approach that has taken over in international and bilingual schools is inquiry-based learning, an example of where this can be seen in International Baccalaureate schools (Coppersmith & Song, 2017). This is fundamentally a student-centered instructional method that encourages students to ask questions and search for answers. A related pedagogical approach is multi-disciplinary education that focuses on integration of different disciplines (Fogarty & Pete, 2009). These approaches take the teacher away from the front of the classroom with students learning passively. Discovering the information and finding the answers becomes a student-led inquisitive process. Reviewing this process along a range of activities remains important to ensure activity validity and solidify the theory of inquiry.

The purpose of this article is to review an activity used within a Multi-Disciplinary Learning lesson and back up or refute the inquiry-based approach with primary learners. This took place in a private bilingual school in China. This article breaks down the activity and provides some suggestions for teachers who use it in the future. It also provides evidence that the inquiry process works and that student-centered learning is a viable means of educating.

The activity gets the students to use authentic and digital materials to find out what the seven continents are and where they are in the world. They find the information out through inquiry and demonstrate learning by creating their own maps.

Inquiry-Based Learning

There are four well-known types of inquiry-based learning: Structured Inquiry, Guided Inquiry, Open Inquiry, and Learning Cycle (Colburn, 2000). Structured Inquiry is where the students are given a step-by-step route to investigating and answering a question, they are not provided with the answers though. Guided Inquiry is where the teacher provides the materials and the problem; the students are required to find their own strategy to solve the problem. Open Inquiry is almost the same as Guided Inquiry but the students formulate their own question. Finally, Learning Cycle is where the students follow a Guided Inquiry process and then the teacher discusses their findings; concepts are introduced after their inquiry. After this, they continue the inquiry process by applying their findings in new contexts.

Inquiry-based learning enables students to learn through exploration. This has been correlated with increased student engagement (Smallhorn et al., 2015). Increased student engagement has been correlated with decreased occurrences of misbehavior (Covell et al., 2009). Abdi (2014) found that 40 fifth grade students who were instructed using an inquiry-based approach across two classes outperformed their peers who were not. This finding supports the effectiveness of the inquiry-based method. There are conflicting findings as well: "…high frequency of inquiry activities was negatively related to achievement." (Teig et al., p. 3). Overall, this correlated with the idea that a mixture of approaches is a logical approach to educating (Colburn, 2000).

The activity that is introduced in this paper follows the inquiry-based approach by having the students collaboratively explore both physical and digital maps (Sotáková et al., 2020). The activity is an example of Guided Inquiry. This means that the students are given a problem to solve and the materials to do so (Colburn, 2000). The activity itself is geared towards a concrete observable concept, what the seven continents are and where they are in the world. Furthermore, through exploring the maps, the students can directly answer the question: "What are the seven continents and where are they in the world?" These two points follow the best practice as advised by the science education research community: "Orienting activities toward concrete observable concepts... centering activities around questions that students can answer directly via investigation" (Colburn, 2000, p. 43). Inquiry can be used in a wide range of disciplines; the activity in consideration here is from the concept known as Multi-Disciplinary Learning.

Multi-Disciplinary Learning (MDL)

MDL is an educational approach that integrates subjects and teaches them within a theme. Thematic learning as an approach has been

shown to be more effective than a conventional approach (Nurlaela et al., 2018). However, for this approach to be integrated with a school's educational system, three key factors must be well managed: "teacher and administration commitment to the integration approach, innovation and effort in curriculum re-design, administration and teachers' coordination of integration plan." (Wicklein & Schell, 1995, p. 70).

Another important aspect of making MDL work is subject integration. This needs to be done carefully and logically, simply including subjects beyond what works effectively is an ineffective practice. It can lead to confusion in the lesson and learning goals can become diluted. On the other hand, if the learning goals integrate well, they support each other resulting in robust student learning (Fogarty & Pete, 2009). An example of a logical integration would be integrating Grammar (how to use full stops), History (when the Mayans lived and what things they invented) and Technology (writing short sentences on a laptop or iPad).

Collaboration

Working collaboratively reaps a multiplicity of benefits for students. Some key benefits are increased engagement, the building of social skills, development of communication, increased peer to peer learning, and the enhancing of critical thinking skills (Gokhale, 1995).

The seven continents activity incorporates group work and collaboration repeatedly. The students start by exploring materials in groups. When the students are doing the individual task, they are still able to communicate and collaborate. The table set up of the classroom is four circular tables where students sit facing each other which facilitates this open communication environment. Collaboration can also be a good way to expose students to technology, they can see how better-versed students model the use and then try themselves.

Technology

Exposing students to technology is important in the modern world. They will be required to be computer literate throughout their school life and even afterwards. It is important for education to prepare students for this (Adam, 2020). The writer of this paper attests to the increased student engagement when students are given the opportunity to use technology, stating that it can even be used as motivation for increased effort and better behavior for learning. Research indicates that when used properly, technology can improve the school environment and support learning goals (Wenglinsky, 1998). The seven continents activity incorporates the use of technology and combines this with inquiry. The students review maps on the interactive white board to find the seven continents and anything else they are interested in. The next section will look at activity implementation and contextual information.

ACTIVITY IMPLEMENTATION

In this section, first, the contextual factors will be explained. Then, the chocolate unit and the seven continent activity will be elaborated.

Ethical Statement

The lesson taught took place within the teacher's (author) homeroom class. This particular lesson and the broader unit are a part of the school curriculum and were planned by the grade two staff. As such, the teacher had all necessary legal permissions to teach the lessons and to conduct the current study. Furthermore, the teacher also had a duty to teach the lessons. It is also important to note that this research is focused on the activity and not the students. None of the students are named in this study. The only details given are relevant to contextualize the setting for the activity.

Contextual Information

This is a private school which runs grade 1 up to Grade 12. It is based in Shanghai, China. The students are bilingual and the classes are not setted, as such, there are language barriers within all classes. They study MDL for three hours each week. During MDL classes, they can speak in both Chinese and English, this facilitates the students with lower-level language skills. Since the students are all English as an Additional Language (EAL) learners, some translated materials are sometimes provided to ensure concepts are not misunderstood. Supporting EAL students with imagery and translation where necessary can

help reduce the barriers these students may face (Adam, 2020).

The classrooms are well equipped and the students have access to technology such as iPads and computers if needed. Classrooms also come equipped with interactive boards. Classes are 24 students in total and they sit in groups of six. This is to facilitate collaboration and group work; it also increases the ease of communication for the students.

There is one teacher present in lessons. There is access to teaching assistants but these are usually reserved for classes with students who have additional needs.

Curriculum Standards

The school uses the Shanghai National Curriculum (SNC) and incorporates some aspects of the International Primary Curriculum (IPC) to enhance the learning. The IPC is a thematic learning curriculum. Integrating this with the SNC makes the use of inquiry for learning a logical step. The activity this study is based on sets the stage for future lessons in this topic "Chocolate". Later on, in the topic, the students will be learning about which countries and continents are the primary Grower, Producer, and Consumer countries in regards to chocolate as a product (Keeling, 2013).

The Chocolate Unit

The school where the author works and this research took place, has used an MDL approach for its five years of existence and all teachers and administration are on board with this. Furthermore, the lessons taught are developed and improved year on year. As such, the activity itself is a constant work in progress, gradually being developed each year. The topic "Chocolate" will be used for 11 weeks and covers aspects of the following subjects:

- History – The topic covers aspects of the Mayans such as their living set up, when they were around and some of their inventions, like drinking chocolate.
- Geography – The topic covers the seven continents, some of the countries in these areas, what the climate is like in these regions and what this climate does to these regions, like Antarctica being cold and snowy.
- English – There is a lot of key language that is picked up during this module, such as habitat. Students also have opportunities to do write-ups and practice literacy skills. They also have plenty of practice in regards to communication due to the heavy teamworking aspect.
- Collaboration – This is a fundamental skill which is developed repeatedly throughout this topic, each lesson should integrate some aspect of this discipline and give students opportunity to develop it.
- Technology – Learning new technological skills is integrated into many of the MDL lessons throughout the whole year, not just during this particular module. Examples include looking at and understanding E-Maps and Learning how to use QR codes.
- Natural Science – Habitats around the world, what animals live there, and how they survive is integrated later on in this unit.

The seven continents activity sets the foundations for these topics to be properly integrated later on. This is done by opening the students mind to the whole globe and introducing them to technology in the classroom. This activity is one of the foundational aspects of this module, once the students have learnt about the continents in the world, they learn about the equator, different weather in different regions, the growing of cacao beans, import and export, fair trade, the history of chocolate including information on the Mayans and much more. It is an 11-week module which covers a lot and is cumulative, so the students need to be interested and have to learn the fundamentals. Most of the lessons within this topic require collaboration.

The Seven Continents Activity

The purpose of this activity was for students to be able to create their own map of the world using the seven continents. The integrated learning goals were:

- for students to learn what the seven continents are, this falls under the subject of geography,
- for students to be able to use them conversationally in English, this falls under conversational English,
- for students to develop their collaborative teamworking skills whilst exploring authentic materials, this is the development of social and collaborative skills,
- for students to be able to use an electronic map, this falls under the subject technology,
- and, for more advanced students to be pushed to further integrate English skills, specifically writing, and then to share this with their peers.

It is a part of the aforementioned topic "Chocolate" which is being used to meet the Shanghai National Curriculum learning goals. Integrating subjects is a process that must be done carefully, needlessly trying to incorporate an additional subject beyond what fits well is poor practice (Fogarty & Pete, 2009).

Materials Needed

The students will need pencils, real handheld maps, an electronic map up on the interactive white board, scissors, glue, worksheet 1 (Appendix 1), worksheet 2 (Appendix 2), whiteboards, and markers. The teacher may choose to use iPads if they are available and time permits.

Step One: Whole Class Map Exploration

The lesson is started with the question: "What are the seven continents and where are they in the world?" This is the question the students need to answer.

The students' attention is grabbed by hiding the authentic world maps behind the teacher's back and saying: "Who knows what these are?" The teacher can slightly peep the maps out from behind their back to get the students interested and excited about reviewing them.

During this step, the students explore authentic materials to see what they can find out. They are encouraged to ask questions and find the answers using the maps. This inquiry phase is done collaboratively using both physical maps and an electronic map on the interactive board. Photograph 1 shows a student looking at the interactive board map. Whilst students took turns to explore the electronic map, their group were giving advice and asking questions. This helped guide them to use the technology and show them where they are in the world. Many students wondered about where their city is located in the world map. It would be possible to let them do this phase using iPads too if they are available. The teacher of this class chose not to use iPads as it would have taken up slightly too much time with this particular class. Using iPads would be an example of deepening students' technology skills. One of the integrated subjects in this activity is technology, whether students learn how to review maps on an interactive white board or iPad, they should be exposed to this as it is one of the disciplines integrated.

This step should take around 10 minutes and students should be encouraged to engage in discussion about anything they can see or are interested in. The questions used in this circumstance were: "What countries are in what continents?" and "Which continents are big or small?" This is fundamentally an inquiry process. The students are trying to answer the question by investigating the map resources. The process of investigation of these authentic resources and the attempt to answer the questions used is where students are being inquisitive, they are doing this themselves, there is no teacher teaching them the answer to these questions, they are finding out these questions themselves.

Photograph 1. A Student Looking at the Interactive White Board Map

It is important to note, students should be encouraged to find out the proper pronunciation of the seven continents, they can ask the teacher for this, and then to use this language conversationally with their peers. The teacher can motivate this using proximity praise or their usual reward system.

The teacher of the class spoke to five students asking if they enjoyed this part of the lesson, all of them gave positive feedback, one comment was: "It was really fun because I got to look at the maps and talk about them with my friends."

Step Two: Groups Map Labeling

Labelling maps is done on individual worksheets but students are collaborating to do this with their whole table (six people). They are told that they should speak with each other and use the maps to demonstrate an answer to the initial question: "Where are the seven continents in the world?" The teacher monitors this activity and questions students when they make mistakes. If many students are making mistakes, it is clear that some more support is needed, e.g., more specific questions such as "Where is Africa?" are posed to the students. Worksheet 1 (see Appendix 1) is the worksheet used. This should only take five minutes. The students can still review maps at this point, they are able to continue investigating and inquiring into the authentic and electronic maps. This stage itself is therefore a follow up of inquiry and investigation that the students lead themselves and attempt to answer the initial question mentioned in this paragraph.

Step Three: Create Your Own Map

Students will need two worksheets (see Appendix 2), scissors, and glue. They will need a blank world map and the seven continents ready to be cut out. They need to cut out the seven continents and stick them on their blank world maps. This step tests whether the inquiry they have undergone has manifested in content memorization and understanding. It shows if they can remember the location of the seven continents and create their own maps using them. Essentially, this shows whether the guided inquiry successfully taught the students the content. This is done individually. This stage should take the students around 10 minutes.

Some of the students placed Africa and Asia in the wrong place at first, presumably due to the words being similar length and both starting with the same letter. The students who did this realized their maps did not look right and changed the placement to where they should be. When questioned as to how they figured this out, one student said: "Asia is bigger so it made my map look wrong when it was where Africa was." Photograph 2 shows a map that a student has created.

Photograph 2. An Example of a Created Map

Step Four: Differentiation by Outcome

This is an extension for students who are fast finishers. The students who do this need to create their own sentences based on their maps. The teacher can provide some simple sentence starters or tell the students to write what they think and found out. Photograph 3 shows how a student has added these sentences to the top of the worksheet with the extra time that he had. The sentences in the picture say: "Brazil is in South America, Mexico is in North America, China is in Asia, France is in Europe."

Photograph 3. An Example of Work with Added Sentences

The sentences written were based on what they could remember from reviewing the maps. This extension further pushes more firmly on the integration of geography and English writing. To ensure all students get some benefit from this extra link of subjects, the ones who did the writing, read their sentences to the class at the end of the activity. Allowing students to benefit from the extended learning goals that fast finishers can achieve is one way of ensuring additional disciplines that are integrated are in at least some way available to all in the class.

Step Five: Assessment as Learning

The teacher puts up an image of the completed worksheet on the interactive white board. Students can look at this and can mark their own work out of 7 points. They get 1 point for each continent they have put in the correct place. Below is a table that shows the results from the lesson this was taught in. Every student met the learning goal. This should take around 5 minutes.

Table 1. Student Success Rates

Student Number	Continents in the Right Place	Continents in the Wrong Place
1	7	0
2	7	0
3	7	0
4	7	0
5	7	0
6	7	0
7	7	0
8	7	0
9	7	0
10	7	0
11	7	0
12	7	0
13	7	0
14	7	0
15	7	0
16	7	0
17	7	0
18	7	0
19	7	0
20	7	0
21	7	0
22	7	0
23	7	0
24	7	0

It is important to note that through this reflective stage, students were able to make slight adjustments to make the distances between their continents. The students were discussing their maps in their groups, asking and answering questions like: “How far apart are your North and South America continents?” Having this *Assessment as Learning* stage allows the students to consolidate their learning (Dann, 2012).

Step Six: Plenary Concept Check

This phase is a simple activity wrap up. It acts somewhat as a summative assessment for this activity. The two questions to be asked are as follows:

1. How many continents are there?
2. Are they all the same size?

To ensure students are not just saying what they hear their friends say, the teacher can provide whiteboards and markers for them to write their answers on and then show all at the same time. Once a question has been asked and answered, the tables can have a minute to discuss their answers; this boosts the communicative aspect of the activity and gives the students an opportunity for peer-to-peer learning should they have any incorrect answers.

In this particular study, all of the students answered the questions correctly. This further backs up guided inquiry as a method of education. The following section concludes this study based on the findings and literature reviewed.

CONCLUSIONS and SUGGESTIONS

The inquiry approach is a successful method of teaching concrete and observable concepts to primary level learners. All of the students in the class learned the lesson content and were able to create their own maps. The teacher reports the learning atmosphere was engaging and as a result, there was no misbehavior to be noted. From the five students consulted randomly, all of them gave positive feedback. A limitation to be noted is this is a one-off study done with only one class, however, the teacher noted that there are some non-inquiry-based lessons where the students do not all meet the learning goals. So, there can be some level of assumption that this

approach is superior.

Research mentioned in the Inquiry-Based Learning section of this study indicate that the inquiry approach is as effective or more effective than other methods and that it supports student achievement (Abdi, 2014). This research supports this notion and backs it up with 100% of the students meeting the learning goals and answering the wrap-up plenary correctly. These results also indicate that the student-centered approach works as the lesson, learning, and inquiry was led by the students, as was the assessment. All of the information the students learned was through their own exploration and inquiry. Research in the same section also shows that the inquiry approach, if overused, negatively impacts achievement (Teig et al., 2018). This paper does not refute this research but it is noted that these students have failed to meet some learning goals in non-inquiry-based lessons.

As an overall conclusion, this paper contributes to the field of inquiry-based learning by backing up the idea that guided inquiry is a successful method of teaching grade 2 students when geared towards concrete observable concepts. The writer of this paper does however state:

> Whilst this paper backs this up, I would not apply only one method of education within the classroom, there are a multiplicity of learners who learn in very different ways, variety is the spice of life, mix things up and try to plan lessons that support all of the students in your class.

To close this study off, some suggestions are provided from the author. The area of suggestion would be on the Assessment as Learning stage of the lesson. Whilst the current implementation did work and was successful, the students were self-assessing based on a completed version of their worksheet. This could have been made more authentic by having the students assess their own work based on the authentic maps. A second recommendation would have been to have the students write the name of the continents on themselves; this would be time dependent though. A final recommendation is to ask students to write one interesting fact about each continent as an assignment. This would encourage further inquiry and integration of language arts.

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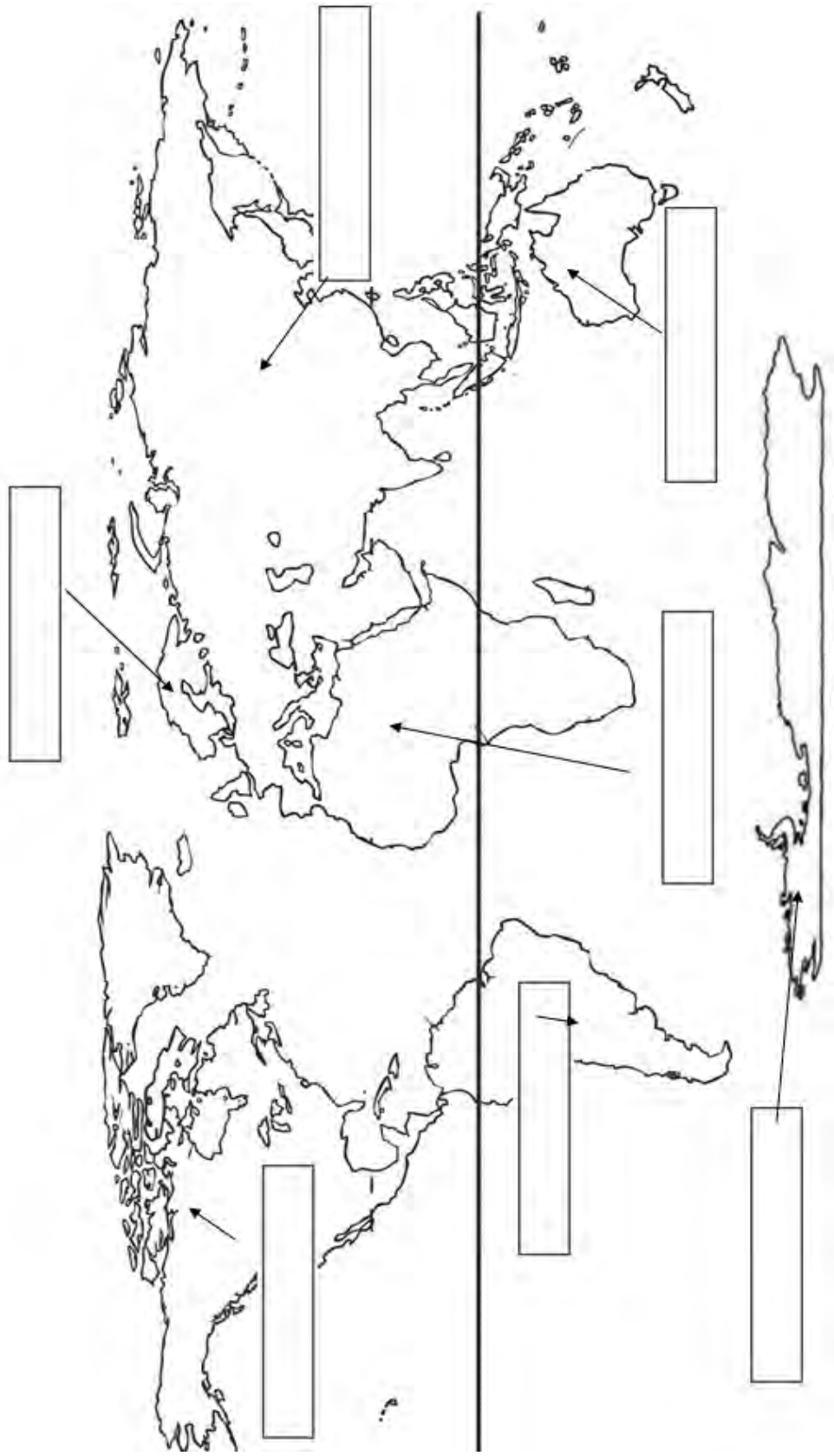
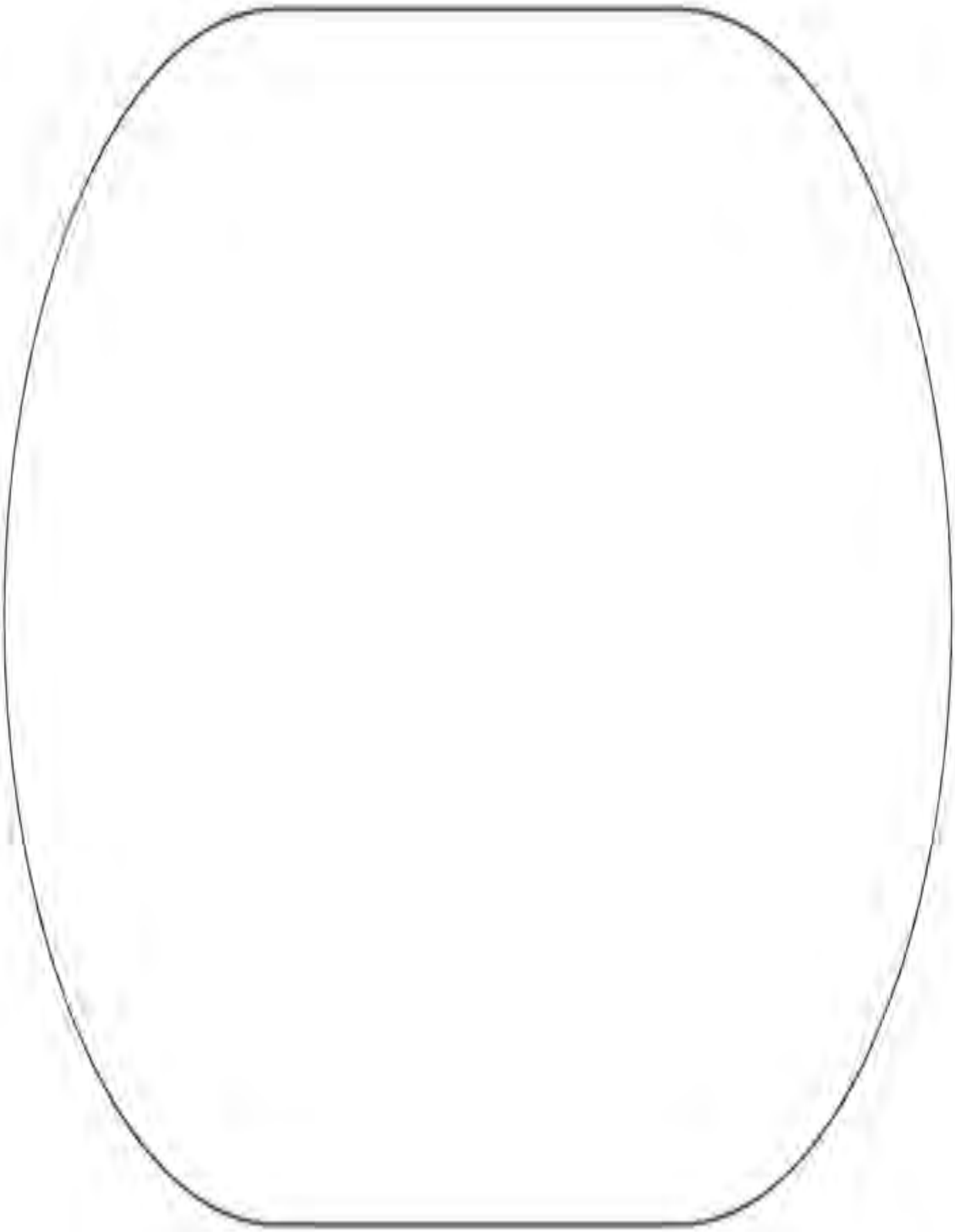
Appendix 1

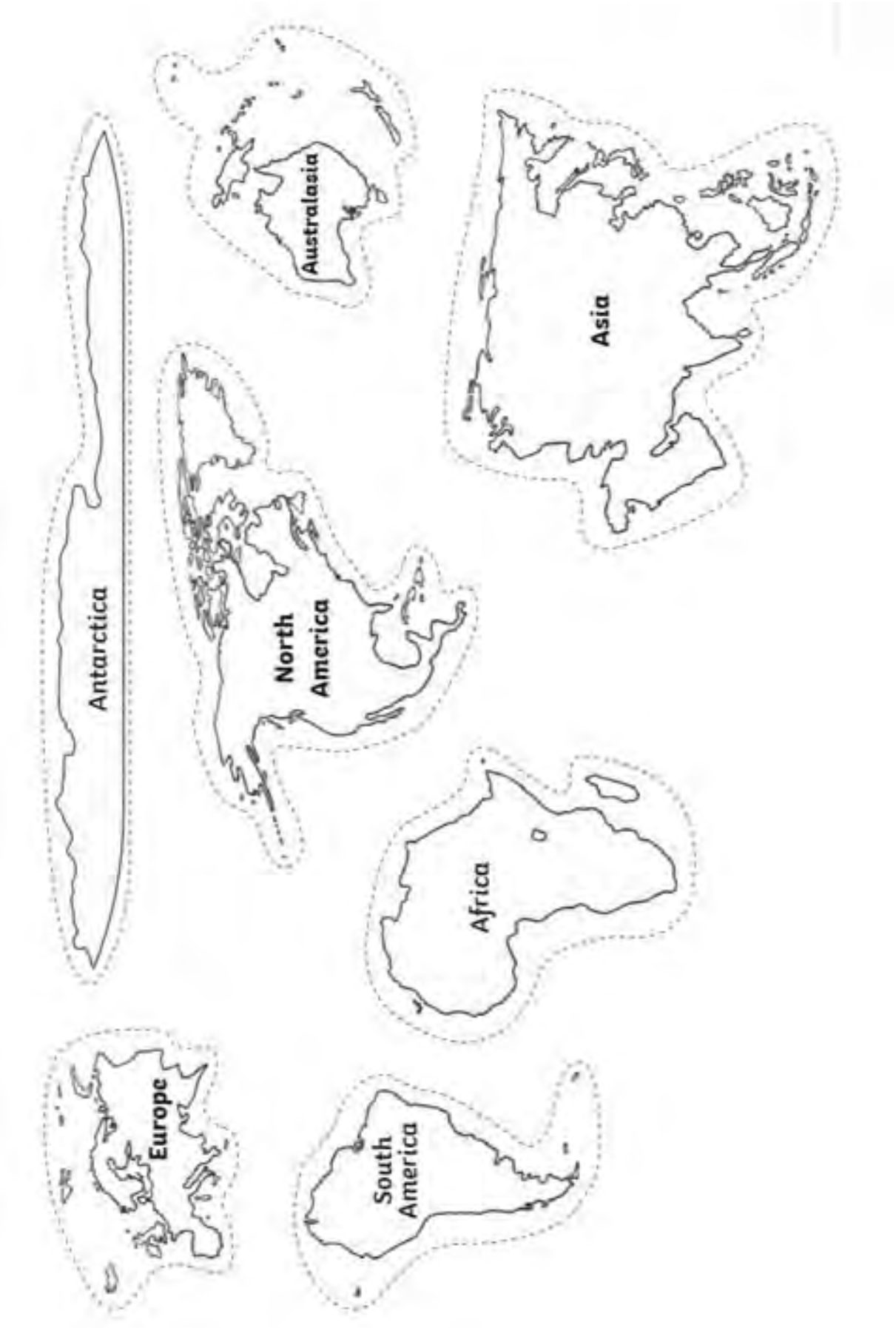
Worksheet 1: Label the Map



Appendix 2

Worksheet 2: Create Your Own Map




Australasia
Asia
Antarctica
North America
Africa
Europe
South America