Journal of Advanced Research in Social Sciences and Humanities
Volume 4, Issue 5 (184-191)
DOI: https://dx.doi.org/10.26500/JARSSH-04-2019-0505

The design and development of Bijak Seni, a teaching and learning module that incorporates computational thinking skills in visual art education for secondary school

HARRINNI MD NOOR *, **IRMA RAHAYU IBRAHIM**

[1] Faculty of Education, Universiti Teknologi MARA, Selangor, Malaysia
[2] Sekolah Menengah Kebangsaan, Selangor, Malaysia

Abstract

Aim: This study aimed to investigate the feasibility of implementing CT techniques in a Visual Art Education setting. A teaching and learning module called Bijak Seni (Smart Art) was designed and developed based on the ADDIE Model to incorporate CT elements into the teaching and learning of drawing and painting at the secondary level.
Method: Presented in the form of a sketch and workbook, this module was printed in color and A3 size. At each tier, a list of learning goals was also included. Students were given ample space to write and scribble ideas. Experts, educators, and students in the field of Visual Art Education participated in a survey.
Findings: Results showed that the application of CT in the Bijak Seni Module helped students understand the requirements of the tasks in the Visual Art Education exam. 95.9% of students agreed that applying the CT process helped them to improve their drawing and painting skills. The module also helped them to identify important requirements of the questions, break down the complexity of the required tasks, analyze the drawings made, develop ideas to define the key requirements of the questions, and select the best media and method to deliver their drawing and painting, to meet the objectives and requirements of the examination questions.
Implications/Novel Contribution: Furthermore, the Bijak Seni Module can also be applied in any art classroom at any level to improve the teaching and learning of drawing and painting based on certain given standards or requirements. Introducing CT in teaching and learning will give good implications for current Visual Art Education in the 21st Century, motivating student learning and increasing innovative thinking among visual art education students.

Keywords: CT, Visual Art Education, Drawing, Painting

Received: 19 August 2019/ **Accepted:** 16 September 2019 / **Published:** 23 October 2019

INTRODUCTION

To put it simply, CT is the application of computers to problem-solving, system design, and the analysis of human behavior (J. M. Wing, 2006). Logic, algorithms, decomposition, pattern recognition, abstraction, and evaluation are the six pillars of CT. Along with reading, writing, and arithmetic, CT is an essential skill for 21st-century education (Computer Science Telecommunications Board, 2010; Malroutu, 2017; Qualls & Sherrell, 2010). It consists of the computational thinking, and the cognitive abilities necessary for algorithmic thinking, pattern recognition, abstraction, and decomposition in computer science (Grover & Pea, 2013; J. M. Wing, 2006, 2008). It aids in processing thoughts and is used to formulate a problem and find its solution, to translate the solution into a form that can be effectively implemented by an information-processing agent (J. Wing, 2011; Bundy, 2007; Taher, Shrestha, Rahman, & Khalid, 2016; Selby & Woollard, 2013).

According to several experts, CT is a must-have skill for the 21st century because it provides students with a new lens through which to view and evaluate problems (Einhorn, 2011; Kamaruddin & Sulaiman, 2017). If we want our students to have the skills and dispositions necessary to succeed in the twenty-first century, education must shift gears. To prepare today's youth for success in the 21st century, educators in the visual arts must adopt new practices and resources (European Commission, 2009). Through the Arts in Education (AiE) approach, educators

*Corresponding author: Harrinni Md Noor
†Email: harrinni@uitm.edu.my

in the Asia-Pacific region are helping their students cultivate critical thinking and interpersonal skills.

Having the ability to think computationally is fundamental to any field, and computational thinking concepts have been applied to other fields through problem-solving methods (Bundy, 2007). Core CT ideas can be woven into the fabric of social studies education by analyzing demographic data for patterns, deducing overarching principles from specific examples, and practicing abstract thought (Ibrahim & Hassan, 2003). As a result, CT is not just limited to computer science, mathematics, and other scientific fields; it can also play a pivotal role in fields like Visual Art Education. CT has the potential to foster creativity in the classroom by allowing students to transition from consumers of technology to building tools that benefit society (Mishra, Yadav, Group, et al., 2013). This is because CT entails learning to think about, represent, and solve problems that require a combination of human cognitive power and computing capacity (Barr & Stephenson, 2011).

LITERATURE REVIEW

Visual Art Education in Malaysia

Visual Art Education is taught as an academic subject in primary and secondary schools in Malaysia. At the secondary school level, it is a compulsory subject for the lower secondary students (age 13 to 15) and an elective subject at the upper secondary school level (age16 to 19). It is aimed at giving students the opportunity to cultivate interest, develop personality, awareness and sensitivity towards the arts and the environment values as well as its relevance to other subjects. The use of strategies appropriate to the teaching content is encouraged to nurture students' interest c. The latest curriculum of Visual Art Education includes two main learning areas Production of Visual Arts (that covers basic art, design, fine arts and visual communication) and History & Visual Art Appreciation.

Art education is a learning tool that can provide education that challenges individual ability to make observations, reasoning, selection, interpretation, and translation of ideas to material or media (Ibrahim & Hassan, 2003). Visual Art Education offered at school encourages students to master various skills based on the National Philosophy of Education so that they are knowledgeable, creative and competitive.

In an increasingly advanced and challenging world, we need to adapt to the current situation. Likewise, for Visual Art Education in Malaysian, the syllabus is now changing and adapting to the needs of modernization and modernity in line with current needs. The purpose is to provide input and the latest useful knowledge to students who can expose themselves to artistic needs in life (Ibrahim & Hassan, 2003). Drawing is also increasingly seen as visual problem solving (Duff & Davies, 2005). By learning the right ways of drawing skills, the student is actually building their path to a way of creativity and able to foster higher-order thinking skills.

METHODOLOGY

The Design and Development of Bijak Seni

Bijak Seni was designed and developed to enhance students critical thinking skills and motivate them to learn visual art. The name Bijak from the Malay language means smart and Seni from the Malay language means art. The name Bijak Seni (Art Smart) was used that holds a positive connotation to build confidence in students to use the module.

Applying the ADDIE Model in Bijak Seni

ADDIE Model was used to design and develop Bijak Seni for its dynamic and flexible guidelines, the most popular for designing instructions, and suits any kind of education. The acronym ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation.

Analysis

In this phase, researchers conducted a brainstorming session to analyze the needs of students like their prior knowledge, interests, and weaknesses. This is to ensure that the development of the teaching and learning module for drawing and painting meets the target users requirement.

Design

At this phase, the researcher determines the learning objectives, types of learning activities, and the media for delivery with CT skills in mind.

Development

The prototype of Bijak Seni was developed at this stage. Presented in the form of a sketch and workbook, this module was printed in colour and A3 size. As shown in Figure 1, students were given ample space to write, sketch, and scribble for ideas.

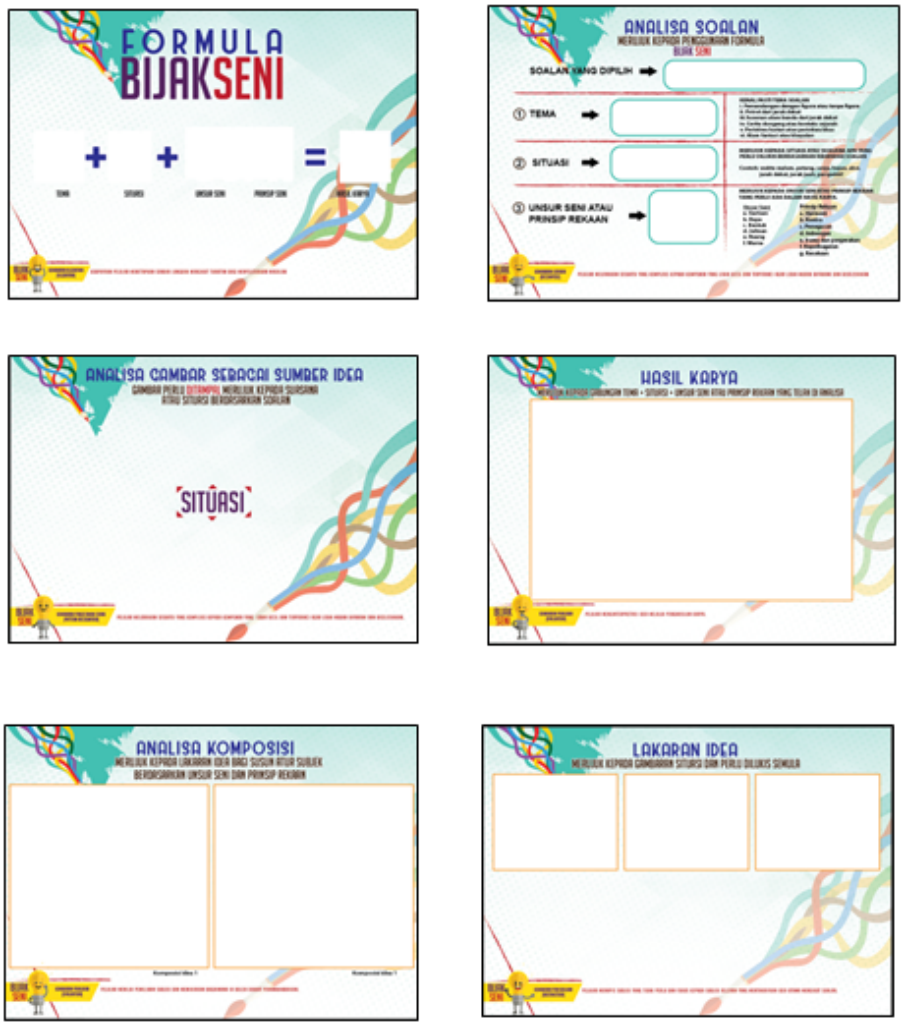

Figure 1. Sample pages of Bijak Seni

Implementation

Bijak Seni was introduced to 67 Form Five students (Age 17). It is mandatory for students to complete all the tasks in the module.

Evaluation

A formative evaluation was carried out at every stage of the design and development phase. This was to ensure that the module meets the requirements and get expert approval in terms of design and content. A summative evaluation was also carried out at the end of the implementation phase to determine the quality of the module in terms of usability. Based on a survey among 67 students who completed the module, 95.9% of students agreed that applying the CT process helped them to improve their drawing and painting skills.

RESULTS AND DISCUSSION

CT Skills in Bijak Seni Module

CT was incorporated into the teaching and learning module to help Visual Art Education teachers in guiding students to find new solutions for problem-solving. In the case of Bijak Seni, the module was to help students develop critical and creative thinking skills by following the CT stages to complete a drawing and painting task. Figure 2 shows how the elements in CT are incorporated in the module.

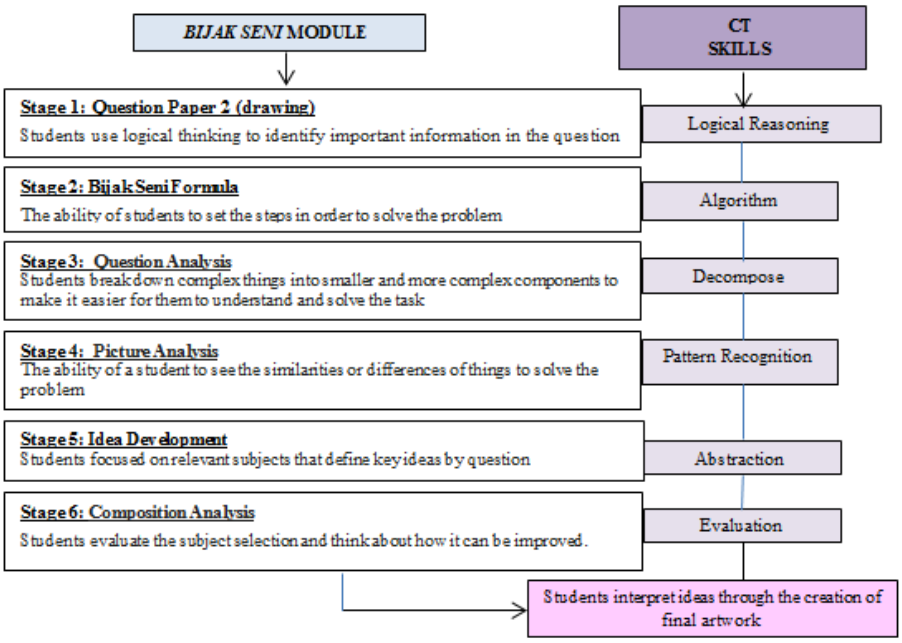

Figure 2. CT in Bijak Seni

Stage 1: Logical reasoning

In this stage, students read through the questions/tasks given to them. They need to identify important information from the task given by highlighting the relevant information from the question and listing the required activities to complete the tasks. They have to use logical reasons to identify important information from the question/task. This way, they are able to analyze the logical connection of themes in each task.

Stage 2: Algorithms

In this stage, students set formula in order to complete the task, which is, in a way, trying to set a code to solve problems. It focuses on the ability of students to set the steps or a formula code in order to solve the problem from the task systematically. This stage is the most important stage because students will experience formulating their own coding language, as it is known as digital skills (Balanskat & Engelhardt, 2015). A formula (Figure 3) was formulated in this research to help students arrange their flow of thoughts.

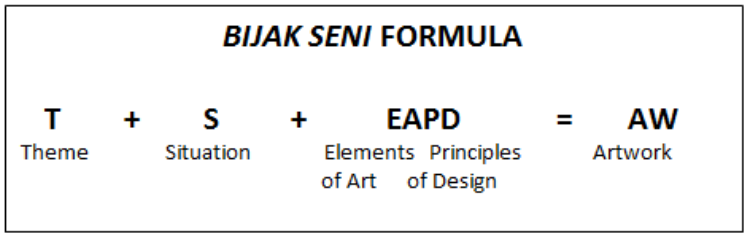

Figure 3. Creating algorithm stage in Bijak Seni

Stage 3. Decomposition

At this stage, students break down complex tasks into smaller components to enable them to solve the task given (Figure 4). Questioning and answering process happens among students and teachers in order to construct the logical information from the first stage, Logical Reasoning. Questioning is an effective technique to engage learners (Naz, Khan, Khan, Daraz, & Mujtaba, 2013) and is evident at this stage.

Example of Analysis of Task – Drawing and Painting Activity
(Based on the formula in Stage 2)

FORMULA	ANALYSIS
TASK/ACTIVITY (example) →	A group of ants is hovering over a dead grasshopper which fell on a dry leaf near a fallen tree trunk. The dead grasshopper is almost decayed. Visualize the situation from a close-up view. Give emphasis to the texture, space, and form.
THEME →	• Close-up, still life, painting
SITUATION →	• a few ants • one almost decayed dead grasshopper • a dry leaf • a fallen tree trunk • close-up view
ELEMENTS OF ART & PRINCIPLES OF DESIGN (EAPD) →	• Texture • Space • Form

Figure 4. Analysis stage in Bijak Seni

Stage 4. Pattern recognition

At this stage, students need to identify the similarities and differences of things to solve the problems. Students are required to visualize the scene based on the analysis done. At this stage, students need a collection of pictures to guide their visualization. This stage is able to enhance the learning process because students will use social media for personalization, collaboration and changing interaction patterns between and among peers and teachers (Redecker et al., 2011) as the source of pictures can be from the Internet, magazines, books or newspapers as shown in Figure 5.

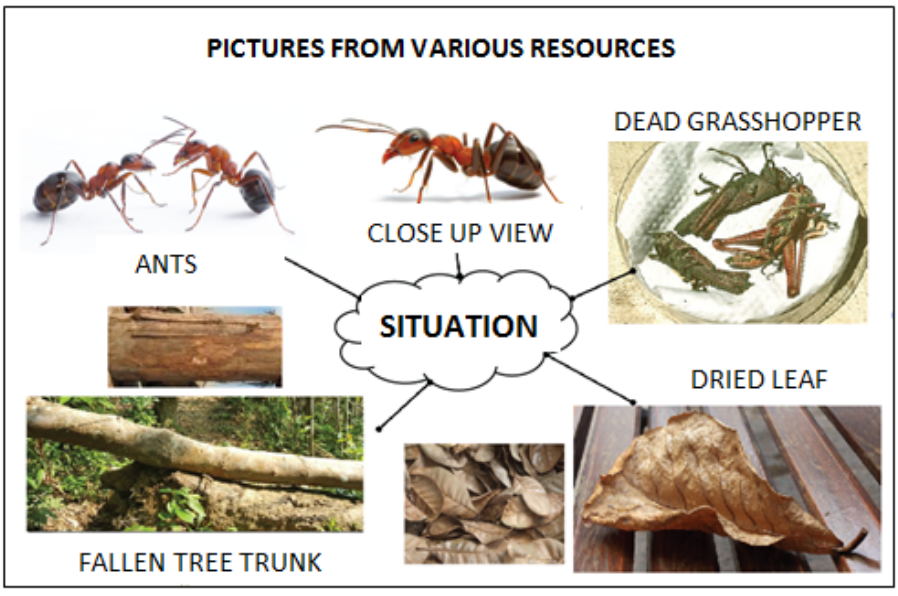

Figure 5. Pattern recognition stage in Bijak Seni

Stage 5. Abstraction

At this stage, students develop their ideas through sketches. They are required to focus on the relevant subject matter identified at the analysis stage and during pattern recognition. Every detail in the drawing will be taken into account to make the drawing as realistic as possible. Examples can be seen in Figure 6.

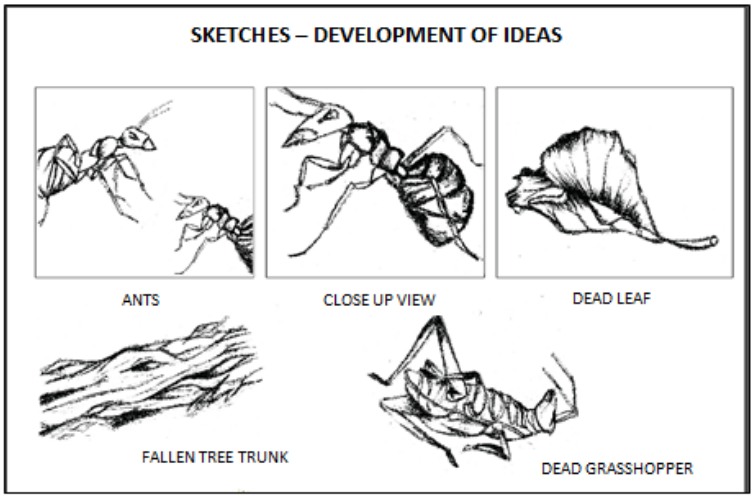

Figure 6. Abstraction stage in Bijak Seni

Stage 6. Evaluation

At this stage, students combine ideas from pictures at the pattern recognition stage to create a variety of compositions. They produce a few sketches with different compositions and make changes to fulfill the requirements of the tasks. This process allows them to evaluate their drawings in terms of arrangements and look at the subject matter. Figure 7 shows an example of sketches based on two different compositions of ideas.

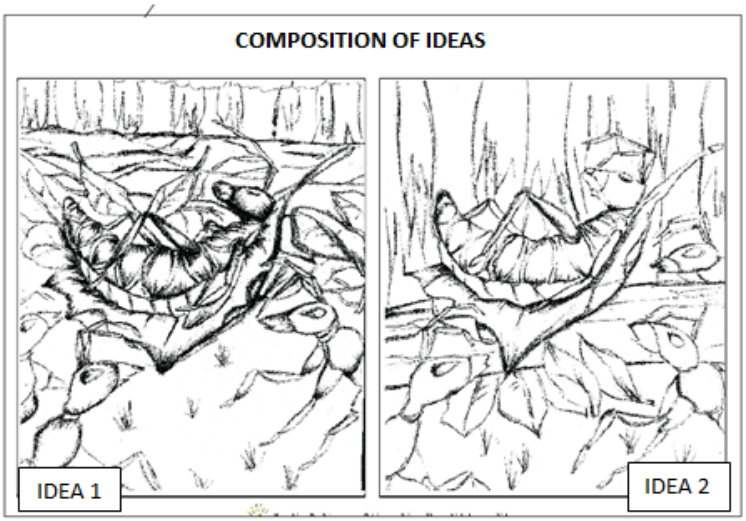

Figure 7. Evaluation stage in Bijak Seni

After completing all the stages, students need to complete the final painting using the appropriate colour and media. Figure 8 shows an example of the final artwork.

Figure 8. A sample of the final artwork

CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

Based on the Malaysian National Philosophy of Education, it is the primary goal of education to develop rational thinkers. It is the aims of the Bijak Seni module to help art students understand the requirements of the tasks in Visual Art Education, namely drawing and painting activities. It is hoped that the application of CT in the module help students to identify important requirements of the tasks, break down the complexity of the required tasks, analyze the drawings made, develop ideas to define the key requirements of the activities, and select the best media and method to deliver their drawing and painting, to meet the objectives and requirements of the given tasks. Thus, enrich teachers teaching and encourage students to explore drawing and painting activities without the use or access to technology because CT is a mental activity. Introducing CT in teaching and learning will give good implications to current Visual Art Education in the 21st Century that motivates student learning and increase innovative thinking among visual art education students.

REFERENCES

Balanskat, A., & Engelhardt, K. (2015). *Computing our future: Computer programming and coding*. Brussels, Belgium: European Schoolnet Press.

Barr, V., & Stephenson, C. (2011). Bringing computational thinking to K-12: What is involved and what is the role of the computer science education community? *Acm Inroads*, *2*(1), 48-54. doi:https://doi.org/10.1145/1929887.1929905

Bundy, A. (2007). Computational thinking is pervasive. *Journal of Scientific and Practical Computing*, *1*(2), 67-69.

Computer Science Telecommunications Board. (2010). *Report of a workshop on the scope and nature of computational thinking.* Retrieved from https://bit.ly/2NPP1cl

Duff, L., & Davies, J. (2005). *Drawing-the process*. Bristol, UK: Intellect.

Einhorn, S. (2011). *Micro-worlds, computational thinking, and 21st-century learning.* Retrieved from https://bit.ly/37lacKY

European Commission. (2009). *Sustainability report. 2009.* Retrieved from https://bit.ly/2tvVr9G

Grover, S., & Pea, R. (2013). Computational thinking in K-12: A review of the state of the field. *Educational Researcher*, *42*(1), 38-43. doi:https://doi.org/10.3102/0013189x12463051

Ibrahim, M. N., & Hassan, I. (2003). *Art education: For colleges & universities*. Jakarta, Indonesia: PTS Publications & Distributors.

Kamaruddin, N., & Sulaiman, S. (2017). A conceptual framework for effective learning engagement towards interface design of teaching aids within tertiary education. *Journal of Advanced Research in Social Sciences and Humanities*, *2*(1), 35-42.

Malroutu, Y. L. (2017). Enhancing student learning experience in blended classroom teaching. *Journal of Advances in Humanities and Social Sciences*, *3*(6), 324-331. doi:https://doi.org/10.20474/jahss-3.6.4

Mishra, P., Yadav, A., Group, D.-P. R., et al. (2013). Rethinking technology & creativity in the 21st century. *Tech Trends*, *57*(3), 10-14. doi:https://doi.org/10.1007/s11528-013-0655-z

Naz, A., Khan, W., Khan, Q., Daraz, U., & Mujtaba, B. G. (2013). Teachers questioning effects on students communication in classroom performance. *Context*, *4*(7), 45-50.

Qualls, J. A., & Sherrell, L. B. (2010). Why computational thinking should be integrated into the curriculum. *Journal of Computing Sciences in Colleges*, *25*(5), 66-71. doi:https://doi.org/10.1002/cc.36819927704

Redecker, C., Leis, M., Leendertse, M., Punie, Y., Gisjsbers, G., Kirchner, P., ... Hoogveld, B. (2011). *The future of learning-preparing the change.* Retrieved from https://bit.ly/37rMyg5

Selby, C., & Woollard, J. (2013). *Computational thinking: The developing definition* (Unpublished masters thesis). University of Southampton, London, UK.

Taher, M. A., Shrestha, P. N., Rahman, M. M., & Khalid, A. K. M. I. (2016). Curriculum Linked Video (CLV) as a tool for English Language Teaching (ELT) at secondary school classrooms in Bangladesh. *International Journal of Humanities, Arts and Social Sciences*, *2*(4), 126-132. doi:https://doi.org/10.20469/ijhss.2.20002-4

Wing, J. (2011). *Research notebook: Computational thinking-what and why? The link.* Pittsburgh, PA: Carneige Mellon.

Wing, J. M. (2006). Computational thinking. *Communications of the ACM*, *49*(3), 33-35. doi:https://doi.org/10.1145/1118178.1118215

Wing, J. M. (2008). Computational thinking and thinking about computing. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *366*(1881), 3717-3725. doi:https://doi.org/10.1098/rsta.2008.0118