

Journal Article Review

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*'Compulsory coding in education: liberal-humanism, Baudrillard and the 'problem' of abstraction*¹

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Associate Professor in Education (Pedagogy and Learning)² Laurence Tamatea of Charles Darwin University of Australia discusses the debate about the relevance and ethics of compulsory coding in an education setting in both Primary and Secondary education settings. .

SUMMARY

The author acknowledges the recent history of coding and its applications in society today. It's relevance is outlined through discussing its value in economics and in wider society, where coding is utilized in other fields of society and industries: stock markets, military, robotics and most recently, in the last 5 years, technologies such as artificial intelligence. Coding is widely used internationally in many areas of society including Primary and Secondary schools and this journal article explores the challenges technology brings to them. The introduction assures that the report does not try to revoke the issue of compulsory coding but aims to deliver a broader understanding of coding, its validity, applications and the importance of following ethical principles to ensure the curriculum is shaped to protect humanistic principles. Technology is constantly expanding and the need for compulsory coding in education is not welcomed by all, including some literature that is examined. Tamatea analyses concerned views between federal authorities, sociologists, professors in related fields of coding such as Information Technologies, Curriculum and Sociology. Throughout the article, the author's evidence is diverse from sources from a wide range of professional expertise and qualification including doctors, sociologists, professors and philosophers. Comprehensive and inclusive, the author collects and examines past and recent literature to confirm or challenge views between sources since the introduction of coding in society and in recent years. Recommendations are drawn to highlight the need for a congruent and an ethical coding curriculum.

¹ Tamatea, L. (2019). Compulsory coding in education: liberal-humanism, Baudrillard and the 'problem' of abstraction. Research And Practice In Technology Enhanced Learning, 14(1). doi: 10.1186/s41039-019-0106-3

² Charles Darwin University. (2020). Laurence Tamatea | Charles Darwin University. Retrieved 26 August 2020, from <https://www.cdu.edu.au/staff/laurence-tamatea>

Research Topics

Social Theory

French sociologist Jean Baudrillard's literature on liberal-humanism and abstraction, is the focal point of this article.

The validity of coding in education is analysed through literature and views from Baudrillard and former United States Secretary of State, Henry A. Kissinger³ on the impact of technology on humanism. Kissinger questions its ethics believing it can be a threat to society, '*As AI becomes ubiquitous, new concepts for its security need to emerge*'⁴

Abstraction is the mental process that involves autonomy, symbolic and creative thinking, not what is physical or seen and Baudrillard's literature on this topic correlates to the discussion throughout the article.

These social theories and views form the foundation for the author's objective in his article.

Abstraction, a computational thinking skill that is utilized in coding: identifying data, conceptual thinking, designing and problem-solving⁵, is the continuous thread throughout this topic and is used to affirm research topics within the article.

Computational Thinking

Based on many views, he states that computational thinking as an essential skill that benefits all areas of development including personal, social, numeracy and critical thinking. The author confirms these findings with multiple authors.

The author extensively cites medical authorities with corresponding views regarding the relevance of computational thinking as a necessary skill, particularly, Doctor of Philosophy, Valerie J. Shute of Florida State University⁶, who states that Critical Thinking is held to be an outcome of computational thinking. Bill Kules⁷, Director of University of Maryland, USA, affirms in an abstract of his article, '*Computational thinking is critical thinking: Connecting to university discourse, goals, and learning outcomes*' that critical thinking is complemented by computational thinking, improving problem solving and cognitive reasoning abilities.

³ Kissinger, H., 2020. *How The Enlightenment Ends*. [online] The Atlantic. Available at: <<https://www.theatlantic.com/magazine/archive/2018/06/henry-kissinger-ai-could-mean-the-end-of-human-history/559124/>> [Accessed 29 August 2020].

⁴ Huttenlocher, D., A.Kissinger, H. and Schmidt, E., 2019. *The Metamorphosis*. [online] The Atlantic. Available at: <<https://www.theatlantic.com/magazine/archive/2019/08/henry-kissinger-the-metamorphosis-ai/592771/>> [Accessed 29 August 2020].

⁵ Thorson, K., 2018. *4 Early Learning Strategies For Developing Computational Thinking Skills*. [online] Getting Smart. Available at: <<https://www.gettingsmart.com/2018/03/early-learning-strategies-for-developing-computational-thinking-skills/>> [Accessed 30 August 2020].

⁶ Shute, V., Chen, S. and Asbell - Clarke, J., 2020. *Demystifying Computational Thinking*. [online] Science Direct. Available at: <<https://www.sciencedirect.com/science/article/pii/S1747938X17300350>> [Accessed 29 August 2020].

⁷ Kules, B., 2016. *Computational thinking is critical thinking: Connecting to university discourse, goals, and learning outcomes*. *Proceedings of the Association for Information Science and Technology*, 53(1), pp.1-6.

Literature Review

Authors central to the journal article, United States national security adviser and former Secretary of State, Henry A. Kissinger⁸ and French sociologist, Jean Baudrillard⁹ are predominantly discussed throughout the report, analysing their justification, credibility and validity in the issue. Authors such as Popat & Starkey, Patrick Bresnihan, Alex de Voogt, and Michel Foucault are used intermittently as substantiated evidence to confirm the two main authors, Kissinger and Baudrillard who are both referenced more than ten times, with Baudrillard mentioned seventy-three times and referenced, twenty-three times making his literature significant to the discussion.

This journal article is neither contested or under review, in the field of science or technology and is accepted as credible study material, published online, supported by international, scientific research and journal libraries, including, 'The Institute of Education Sciences (IES)'¹⁰ in the U.S and 'Springer Open'¹¹, an open access journal resource library, affiliated with Springer Nature Group, in Stuttgart, Germany.

Tamatea has concerns for Baudrillard's claims of 'humanity's deepening engagement with digital abstraction' and the implications this view has on the technology world. The author claims that physical and psychological interactions in technology '*blurs boundaries between subject and object*' but does not provide supportive scientific or medical evidence to that claim.

In his conclusion, Tamatea reveals his subjective views, persuading the reader to side with Kissinger stating that he was 'right regarding our times' in relation to the view that we live in a digital age that can overpower us.

Overall the author is inclusive in his research, examining opposition to compulsory coding from authors who claim that liberties and rational thinking are undermined when compulsory coding in education is enforced. This bias towards Kissinger could be intentional to draw attention to the need for action, to create ethical practices in the coding curriculum. The author draws upon Kissinger's views throughout the article, concluding upon his views that ethics in coding is the crucial focus that is needed in compulsory coding, to ensure the digital age does not overpower or threaten peoples' liberties and freedoms.

⁸ Kissinger, H., 2020. How The Enlightenment Ends. [online] The Atlantic. Available at: <<https://www.theatlantic.com/magazine/archive/2018/06/henry-kissinger-ai-could-mean-the-end-of-human-history/559124/>> [Accessed 29 August 2020].

⁹ Beer, D., 2005. *View Of Sooner Or Later We Will Melt Together: Framing The Digital In The Everyday | First Monday*. [online] Firstmonday.org. Available at: <<https://firstmonday.org/ojs/index.php/fm/article/view/1268/1188>> [Accessed 29 August 2020].

¹⁰ Tamatea, L., 2019. *Compulsory Coding In Education: Liberal-Humanism, Baudrillard And The 'Problem' Of Abstraction..* [online] Eric.ed.gov. Available at: <<https://eric.ed.gov/?id=EJ1232602>> [Accessed 30 August 2020].

¹¹ Tamatea, L.. (2019). *Compulsory coding in education: liberal-humanism, Baudrillard and the 'problem' of abstraction*. Available: [https://link.springer.com/article/10.1186/s41039-019-0106-3#:~:text=Today%2C%20Baudrillard%20asserts%20abstraction%20is,%20\(Robinson%2C%202012\)..](https://link.springer.com/article/10.1186/s41039-019-0106-3#:~:text=Today%2C%20Baudrillard%20asserts%20abstraction%20is,%20(Robinson%2C%202012)..) Last accessed 30th August, 2020

This intended bias can also be a tool to highlight the need for ethics in coding, sound practices in order to protect rational and autonomous thinking.

Author's Key Theoretical Framework

Laurence Tamatea bases his journal article on the debate surrounding the ethics and significance of coding in schools, addressing principles of liberal-humanism, abstraction and how technology is impacting these in an educational setting.

The author is invested in this issue, advocates liberal-humanism and embeds this theory in his teaching, ethos and application. He specialises in coding and has written reports with aims to develop a coding curriculum and software programs for disadvantaged school students in Bali, Indonesia.¹² Laurence Tamatea has established and operates his website, 'Code and Programm.com'¹³ that outlines the establishment of his coding curriculum, He teaches and writes curriculums surrounding coding and associated reports in technology. Mr Tamatea, a Research Active Associate Professor at Charles Darwin University, has strong existing knowledge of the issues he addresses, as he teaches coding to tertiary students and is in the process of creating a coding curriculum¹⁴ for youth students in Indonesia.

Design and Methodology

Tamatea's article begins by outlining the debate surrounding coding in schools between authors, with strong philosophical and social concerns, providing insight and references from Henry A. Kissinger who opposes 'the rise of artificial intelligence'¹⁵, technology potentially dominating liberal-humanism: human cognitive processes such as reasoning, autonomous, critical thought which Baudrillard advocates in his literature.

Results and Key Findings

¹² Tamatea, L., & Pramitasari, G. (2018). Bourdieu and programming classes for the disadvantaged: a review of current practice as reported online-implications for non-formal coding classes in Bali. *Research and practice in technology enhanced learning*, 13(1), 1.

<https://doi.org/10.1186/s41039-018-0068-x>

¹³ Tamatea, L. (2020). About – Code And Programm. Retrieved 28 August 2020, from <https://codeandprogramm.com/2020/04/07/about/>

¹⁴ Charles Darwin University. (2020). *Personal Profile*. Available: <https://researchers.cdu.edu.au/en/persons/laurence-tamatea>. Last accessed 30th August, 2020

¹⁵ Kissinger, H., 2020. *How The Enlightenment Ends*. [online] The Atlantic. Available at: <https://www.theatlantic.com/magazine/archive/2018/06/henry-kissinger-ai-could-mean-the-end-of-human-history/559124/> [Accessed 29 August 2020].

In support of Baudrillard's literature, that the world has become reliant on models and simulations, describing abstraction colloquially as 'the map',¹⁶ Tamatea supports this mental process to find better ways to enhance it in the coding curriculum.

Tamatea discusses both sides of debate, trying to dispel misconceptions involving coding in schools, that children should not be introduced to it, at an early age. The author tries to bring perspective to a topic that is mixed and inconclusive.

Through his research he discovers that the debate surrounding compulsory coding is based on economic and social factors. Those that agree believe it builds economies, strengthens initiative and personal responsibility whereas those who oppose believe that technology pervades society, digital ubiquity¹⁷, technology being ever present in our daily lives can destroy humanism.

Tamatea insists that he does not aim to disprove Baudrillard or Kissinger but to acknowledge the importance of humanism, incorporating abstraction as a basis for ethical practice in compulsory coding instruction.

The author discusses the concept of coding, its prevalence in society today, from education to business, its purpose and its validity in economies around the world.

He examines sources from past and recent authors resulting in a thorough examination on the validity of coding in society and education. Considering views from both different perspectives concerning compulsory coding in schools.

Political Philosophy

He recognises an absence of discussion in education and literature surrounding the issue of political philosophy whereby the liberties and rights of the individual, must be addressed and studied in order for the curriculum to be ethical and liberal. The author uses the early introduction of Coding in German schools as a model of discussion and direction towards creating effective principles, a political philosophy to guard human autonomy in a subject that is greatly immersed in the digital world. The term, 'Informatische Bildung'¹⁸ relates to a sociological philosophy that German schools practice as an ethos, throughout their curriculum with morality and self-regulation as core principles. Author, Meinert A. Meyer, Professor of the University of Hamburg, outlines the structure and purpose of this principle as a holistic and comprehensive approach to learning that endeavours to promote meaning and purpose to learning, not just acquiring knowledge.

Political philosophy as a principle in coding is addressed as an important factor in implementing a cohesive coding curriculum that takes into consideration humanistic

¹⁶ Poster, M., 1988. *Baudrillard_Simulacra And Simulations*. [online] Web.stanford.edu. Available at: <https://web.stanford.edu/class/history34q/readings/Baudrillard/Baudrillard_Simulacra.html> [Accessed 30 August 2020].

¹⁷ Iansiti, M. & Lakhani, K.R. (2016). *The Future of Operations: The Era of Digital Ubiquity*. Available: <https://hbr.org/webinar/2016/05/the-future-of-operations-the-era-of-digital-ubiquity#:~:text=Digital%20ubiquity%20is%20revolutionizing%20business,they%20create%20and%20capture%20value.&text=Operations>. Last accessed 30th August, 2020.

¹⁸ Meyer, M.A. (2009). *What is »Bildungsgangdidaktik«?*. Available: http://rhinodidactics.de/Artikel/bildungsgangdidaktik_en-2009-04-01.html. Last accessed 30th August, 2020.

principles where individual liberties, rights and freedoms should be protected. This philosophy is an important element to delivering a coding curriculum that is ethically driven, not just technological.

Methods

The author describes his research processes describing his methods of study and data collection including his primary and secondary sources. Tamatea provides a description of his Google search results and lists them in tables outlining the themes and keyword searches he used to find sources that were relevant and credible to his final outcome. He shares that some of his data collection through Google resulted in inconsistent, vague, inconclusive information. These results are not disclosed in the report although, large proportion of his formal research was collected using an Australian University online library with greater access to international databases¹⁹.

Data collection methods are discussed primarily surrounding the focus of his report, the debate between conflict of interest between the main authors Kissinger and Baudrillard.. Critical Discourse Analysis²⁰ was used to study the truths of coding in school, not to confirm them²¹. This method is applied to issues that involve social practice - norms, behaviours, ethical guidelines in social situations²², relatively, schools. Tamatea clarifies in detail the validity of this method of analysis referring to some of his article and how it applied to his research and journal article.

Tamatea demonstrates his strong ethical understanding by declaring his profession, industry experience and qualifications in Education Sociology, Computer Science, and Computer Programming.

Recommendations

Tamatea recommends popular mixed opinion should focus on the philosophy of coding rather than the negative response of coding now being compulsory in education. Technology is already embedded into the fabric of society and attention should primarily be on its impact on humanism and abstraction and to protect them.

¹⁹ Tamatea, L. (2019). Compulsory coding in education: liberal-humanism, Baudrillard and the 'problem' of abstraction. *Research And Practice In Technology Enhanced Learning*, 14(1). doi: 10.1186/s41039-019-0106-3

²⁰ Janks, H. (2020). Critical Discourse Analysis as a Research Tool. Retrieved 27 August 2020, from <https://www.uv.es/gimenez/Recursos/criticaldiscourse.pdf>

²¹ Tamatea, L. (2019). Compulsory coding in education: liberal-humanism, Baudrillard and the 'problem' of abstraction. *Research And Practice In Technology Enhanced Learning*, 14(1). doi: 10.1186/s41039-019-0106-3

²² Holtz, G. (2020). Generating Social Practices. Retrieved 27 August 2020, from <http://jasss.soc.surrey.ac.uk/17/1/17.html>

Since 2018, coding has been compulsory in Australian education²³ and it's vital that it protects the humanistic values of learning in such a digitalised world that is clearly integrated into learning environments today. Tamatea's comprehensive research and experience as a teacher in Australia and Indonesia, should serve as a positive catalyst to adopt a philosophy in coding that protects humanistic principles in an increasing digital age.

Reviewer's Conclusion

Tamatea concludes that Computational Thinking is vital to a student's learning and is crucial as Literacy and Numeracy, a mental process that is fundamental to Abstraction²⁴.

Tamatea leaves Baudrillard's stance on digital abstraction open for discussion as compulsory coding in schools is still a new component in the curriculum while performance data and the impact on student learning is still being collected, monitored and assessed.

The conclusion also reveals the author showing bias towards preferred authors which can also be interpreted as a way to address the importance of liberal-humanism in coding.

Reinforcing Kissinger's words, '*we are indeed in need of a new guiding philosophy*' (2018)',

This final alert in his conclusion addresses the need for action to be taken: the principle of creating ethics to coincide with compulsory coding, to ensure ethical practices are in place in order to protect liberal-humanism.

²³ Baker, J.. (2018). *Coding to be mandatory in primary, early high school*. Available: <https://www.smh.com.au/national/nsw/coding-to-be-mandatory-in-primary-early-high-school-20180817-p4zy5d.html>. Last accessed 30th August, 2020.

²⁴ Australia, E., 2020. *Computational Thinking | Digital Technologies Hub*. [online]

Digitaltechnologieshub.edu.au. Available at:

<<https://www.digitaltechnologieshub.edu.au/teachers/topics/computational-thinking>> [Accessed 30 August 2020].

CDU Assessment: Journal Article Review – High Distinction

Criteria	Outstanding	Very Good	Good	Satisfactory	Unacceptable
Context Relevance in the field of education and curriculum	Place of study in the field clearly described, illuminating links to other studies and topics made	Place of study in the field clearly described, some reference to relationship to other studies or topics	General relevance of study in field described	Attempt made to place in context, possibly not quite appropriately	No attempt made to describe context of study
Evaluation of the study	Clearly articulated, well supported statements of value and/or shortcomings of study	Evaluation includes positive value of study as well as clearly supported explanation of shortcomings	Good attempt at evaluation with some support for conclusions; possibly more negative than positive comments	Some attempt at evaluation, comments valid but not necessarily well supported	No attempt to evaluate study or evaluative statements unsupported or inappropriate
Overall organization See note below** Writing a Journal Article Review** This is a priority focus	Discussion of overall purpose, methods, results, findings and conclusions of study clearly stated; seemingly effortless and seamless logical flow	Discussion of overall purpose, methods, results, findings and conclusions of study clearly stated; logical flow always easy to follow	Discussion of overall purpose, methods, results, findings and conclusions clearly stated; most of presentation flows logically	Discussion of overall purpose, methods, results, findings and conclusions stated; possibly some awkwardness in logical flow	Discussion of overall - Major sections missing and / or lack of logical flow
Clarity of explanations	Sophisticated use of language maximizes interest, enjoyment and comprehension; explanations very clear, factually correct	All explanations clear and easy to understand, factually correct	Most explanations clear and easy to understand, mostly factually correct	Overall meaning is understandable; possibly some areas of slight confusion or minor factual errors	Significant difficulty explaining ideas, major factual errors; lack of comprehensibility
Use of Terminology	Correct use of all terminology and concepts,	All terminology / concepts used correctly and	Few errors in use of terminology /	Most terms used correctly,	Jargon / clichéd terms used incorrectly, without

y and concepts	attention to nuances of meaning, judicious use of clearly defined jargon	defined clearly, including terms with different common meanings; overuse of jargon avoided	concepts; definitions provided for technical terms, overuse of jargon avoided	possibly some incorrect usage or use of unnecessary or undefined jargon	definition; attempting to sound "scientific/academic" without understanding meaning of terms
Implications for education and digital technologies	Excellent sense of worthwhile insightful research questions demonstrated, leading to generation of hypothesis	Questions generated based on the review could lead to excellent research project	Review leads to several valid questions which could be answered with further study	Questions generated relate to further study but may be difficult to address in practice	No valid questions generated, and questions cannot be addressed with further study
Literature referenced	Literature referenced is exceptional quality, extensive and includes unit and non-unit cited material	Literature referenced is high quality, and includes unit and non-unit cited material	Literature referenced is sound, includes unit and non-unit cited material	Literature referenced is sound, relying mostly on that presented in the unit material.	Literature mostly not referenced, mostly not linked to the task, of very low quality
Overall Mechanics -written expression: grammar, spelling, language domain.	Overall written expression: grammar, spelling and appropriate language is of very high standard with only 1 – 2 grammatical errors. APA Guidelines are meticulously followed (incl 'Reference list) Length appropriate	Overall written expression: grammar, spelling, and appropriate language domain is of adequate - with standard minimal grammatical errors (3-5). APA Guidelines are consistently followed (incl 'Reference list) Length appropriate	Overall written expression: grammar, spelling, and appropriate language domain is of acceptable standard many numerous grammatical errors (6-11) APA Guidelines are mostly followed (incl 'Reference list) Length appropriate	Overall written expression: grammar, spelling, and appropriate language domain is of very poor standard with wide ranging grammatical errors (11-20) Little ability to use APA Guidelines (incl 'Reference list) Length: appropriate	Overall written expression: grammar, spelling, and appropriate language domain constructs discussion that is very difficult to follow. No APA Style Guidelines follows (incl 'Reference list) Length: Too Long / short

Writing a Journal Article Review**

The following issues will need to be addressed as sections in this review:

- Research topic (what has been researched by the author. Is it of any relevance and why / why not and to whom)?

- Literature review (e.g. what literature did the author review. What was its significance to the argument? Were there any gaps in the existing literature base? How is this article positioned in the field? Does the author base their argument on any particular other writers? How does this article contribute to the field?)
- What are the author's key theoretical frameworks?
- Design/methodology [i.e. 'Methods'] (e.g. how did the writer collect data? What was used as data? How did they analyse the data, and how did they interpret the data)?
- Results and findings (e.g. what were the results of any initial analysis? How were these interpreted? What were the key findings)?
- Recommendations. (Did the author offer any recommendations? Have these been made before. If so, what was the consequence? What can we do in response to these)?
- Reviewer's own conclusion (Based on 'evidence'. Consideration of implications arising from the article's findings).