

What Does It Mean to Make Inferences?

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Introduction

“*Wie es eigentlich gewesen,*” declared Leopold von Ranke. Despite many successive and successful intellectual assaults on the axioms of this methodology, it remains the guiding principle and aspiration of historians today. The main goal of the historian’s craft is still to report things as they are (Anthony, 1994). However, historians are not time travelers, and the only way to pierce the murky veil of time is through the imperfect crystal ball spun from a patchwork of sources. Consequently, the use of sources and historical evidence to dutifully reconstruct what likely happened in the past is the bread and butter of the historian’s craft. From Herodotus and Thucydides, to the historians of today, the use of a combination of primary and secondary sources to answer one’s inquiry question about the past stands to be the only constant in the methodology of a historian (Carr, 1961).

While the objective of classroom history is not to create little historians, it – at the very least – aspires to convey and inculcate a host of transferrable skills to students. The value of these skills should not be understated. The historical discipline was a product of a series of intellectual developments during the 18th and 19th century, and it was closely intertwined with that of state-formation and nationalism. This cozy relationship led to the birth of academic history in the German universities as a means of training civil servants by heightening one’s sensibilities towards competing narratives, a multitude of

sources, and the need to piece them together into a single coherent narrative with causal links (Shotwell, 1939). The value of source-based skills does not lie in the training of historians, but rather the honing of critical thinkers who can make sense of an increasingly complex world around them.

While there is no single prescribed “historian’s process”, a commonality that runs across all historical work is the act of drawing inferences through the examination of sources. It is a foundational part of the discipline, yet it is also a skill that is often neglected when it comes to teaching it in the classroom; writing frameworks are always brought up but inferences are rarely taught. This is likely a product of the apparent *irreducible complexity* of the skill, leading many to pass it off as a thought process that cannot be scaffolded and dissected to any meaningful degree.¹ As a result, the ability to make inferences was relegated to the innate ability of the student, with minimal *actual* guidance on the thought processes behind making inferences - and a lot of emphasis on how a paragraph presenting that inference should look like. This notion of irreducible complexity permeates the way we teach in the classroom, and the way we assess for this skill. Aside from the problems with the way the process of drawing inferences is being laid out in the classroom, there are also wider problems with the way the skill is currently situated within the historical inquiry process, which in turn influence how “inference questions” are asked.

What this paper aims to do is to first contextualize the act of making inferences within the inquiry approach, and demonstrate how questions that assess the skill of making inferences can be better phrased with more precision (while taking into account how inquiry is used in the teaching of humanities subjects in Singapore). The subsequent section will then break down the thought processes behind making inferences into smaller and distinct steps, and demonstrate how following each rung of the thought process will make for a better levels of response marking scheme (LORMS) that can accurately reward the moves that go towards drawing inferences, rather than rewarding peripheral skills such as the ability to present an answer in a coherent fashion. Finally, the last section of this paper will then discuss the positive spin-off benefits that an accurate mapping of the skill of making inferences can have in a historical classroom and show why the close partnership between teaching and assessment is necessary to deliver effective classroom learning.

Asking better questions - Contextualizing Inferences within the Inquiry Approach

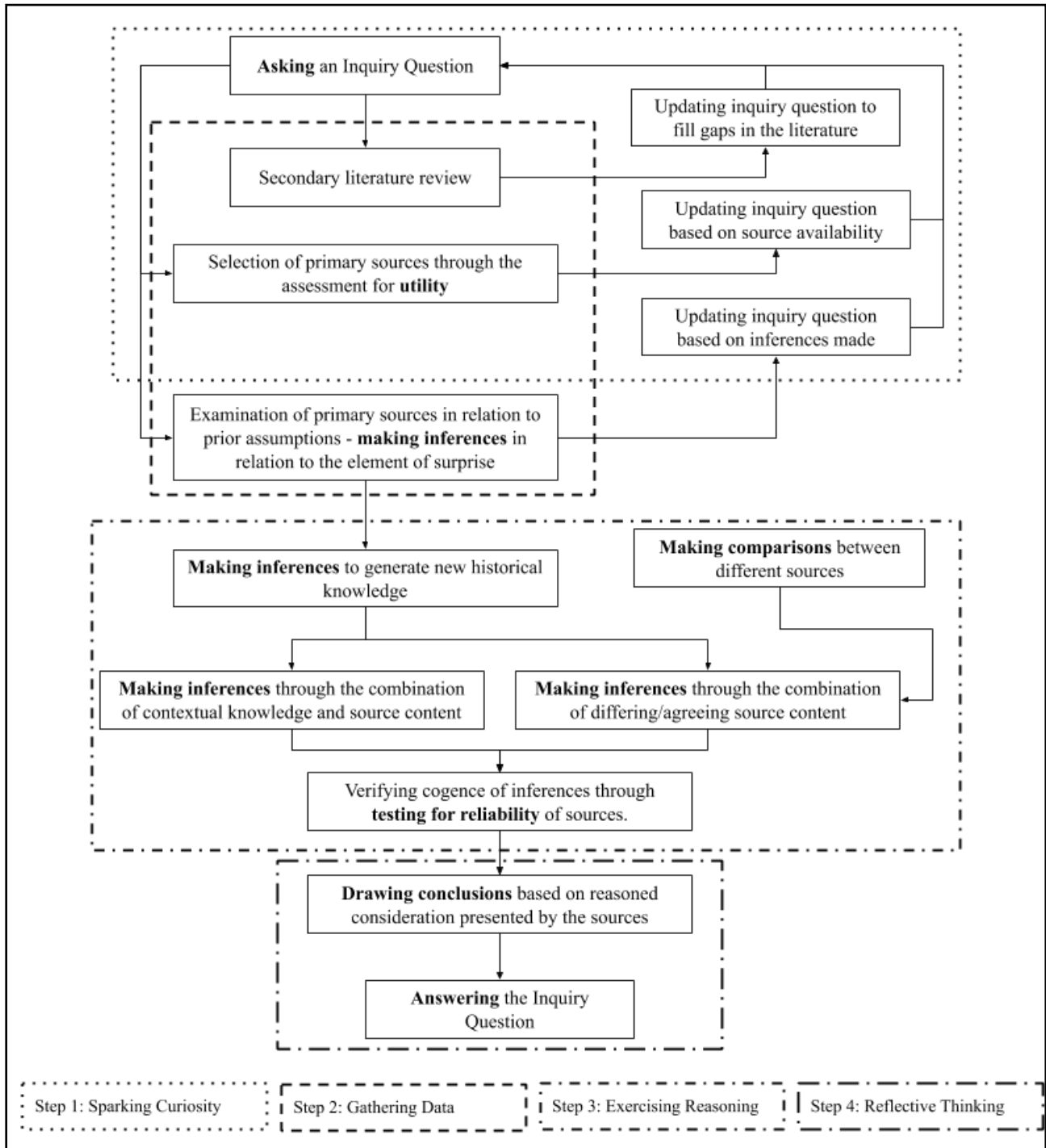
Despite the dual recognition of the centrality of the inquiry approach to humanities education, and the acceptance that primary sources prove to be a valuable avenue for historical education, there still exists a gulf of understanding as to how source-based work fits into the inquiry approach (MOE, 2012). This gulf manifests itself in the way the questions intended to assess for the skill of making inferences are currently being asked, and from the current way we define and come to understand what it means to make historical inferences.

By implication, the implementation of

the inquiry approach appears to be cursory. After all the talk of an inquiry approach, the assessment which too often dictates the beats and steps of classroom instruction ultimately pays minimal heed to any higher aspirations of an inquiry-based learning. There appears to be a lack of awareness of the position of “inferences” in-relation to other source-based skills and the entire historical inquiry process. Furthermore, there also appears to be a lack of understanding as to what is involved when making historical inferences. As a result, inference is currently the label used on any source-based question that does not fit into other type of skills out there, and the way inference questions are phrased heavily suggests a lack of understanding of what historical inference entails in the inquiry process.

The figure below (*Figure 1*) illustrates the position of ‘inferences’ and the other common source-based skills within the historical inquiry process. While history in the classroom is not entirely the same as academic history, there are relevant parallels that will be demonstrated later. Most importantly, the act of making inferences occupies a specific niche which involves the creation of new knowledge by using new pieces of information in primary sources, in conjunction with pre-existing knowledge gathered from reviewing the state of the historical literature in order to answer a specific inquiry question. The process of combining these two is a complicated mental process of inductive reasoning, and does warrant more analysis and closer thought. Should this new historical understanding be completely contradictory to that of the prevailing wisdom, we might well label it *revisionism*; but should it be in agreement with the prevailing conventional wisdom, then it is an act of generating a clearer image about the past that we already know the rough image of.

Figure 1. Outline of the Source-Based Skills in relation to the inquiry cycle in the context of real historical writing. Even though the process will likely defer from historian to historian, this general outline remains useful.

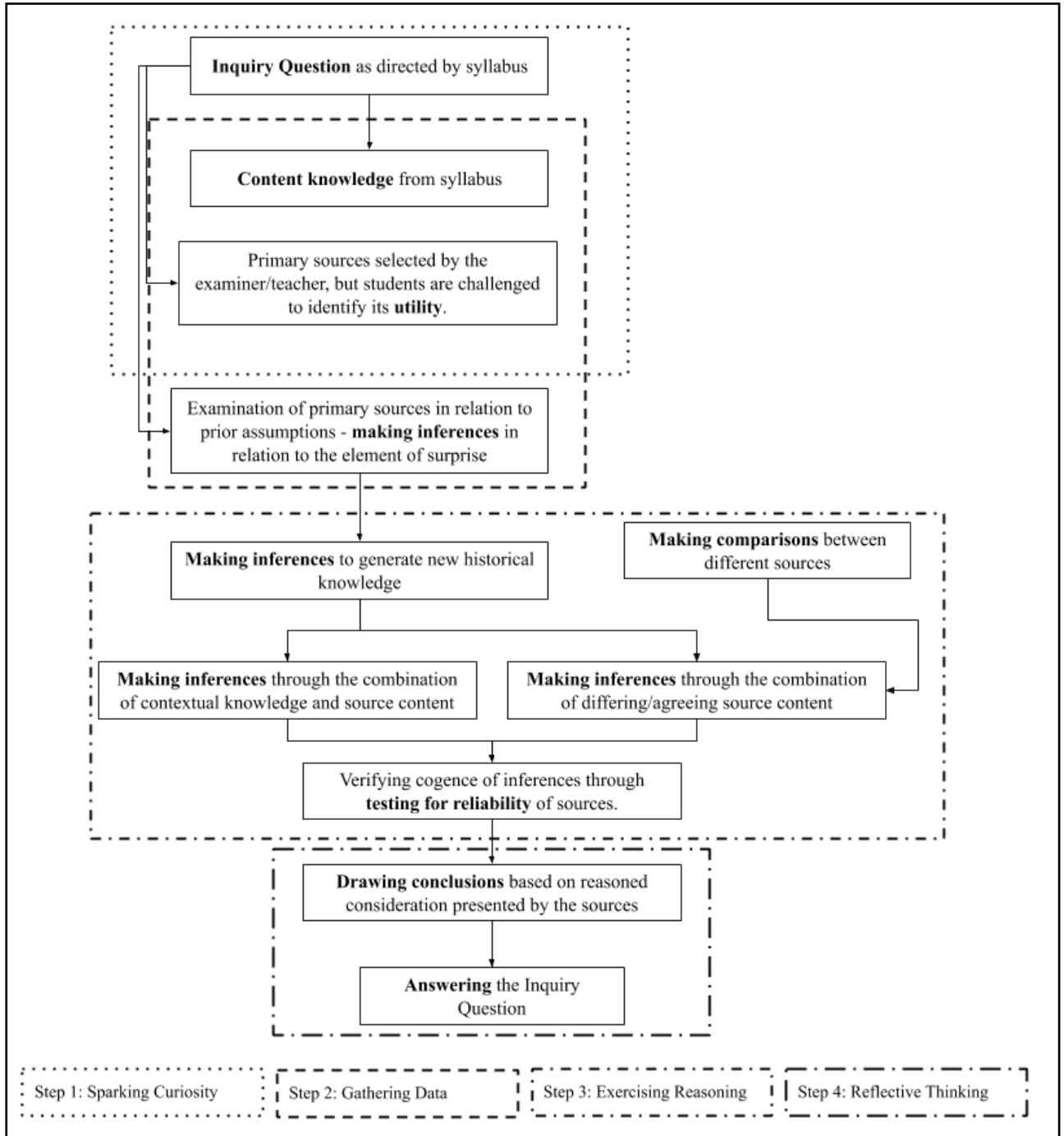


The current imprecision and lack of a frame of reference to the historical inquiry approach in the process of formal assessments manifests itself in two manners. First, there appears to be a fundamental misunderstanding in what is entailed when ‘making inferences’, and how oft-labelled ‘inference questions’, in reality, are merely testing for the ability to read and comprehend sources. This is not a fault common to teachers in the classroom, but also a confusion that was furthered in the Teaching and Learning Guide (TLG), which recommended the use of question stems as such as “what is the message of the source”, and “does the source support...” as ways of assessing for the skill of making inferences (MOE, 2012).ⁱⁱ Neither question stems prompts students to utilize the primary source to generate new historical knowledge through inductive reasoning - which is the main objective of drawing inferences, as demonstrated by *Figure 1*. Nor does either question stem prompt students to think about the sources as potential evidence to uncover, discover, and create knowledge about our past. To treat these two question stems as part of the

toolkit to assess for inferences only serves the goal of formal assessments as it rewards students for source comprehension without allowing proper assessment on the actual process of making cogent historical inferences.

Aside from conflating source comprehension for the act of inferring, the lack of a reference to the historical inquiry approach also means that questions aimed at assessing the skill of drawing inferences may not contain any inquiry focus. What could be seen from *Figure 1*, and also from *Figure 2* below is that all inferences must be performed in relation to an attempt at responding to an inquiry question. This may be evident from a common way of introducing students to the process of inference, that is, to ask them to imagine themselves to be detectives on a crime scene, and to infer what happened based on the evidence present. This process itself already has a directed inquiry question as students are tasked to think about what happened in the crime scene.

Figure 2. illustrating the cut down version of source-based work in the classroom compared to Figure 1. The key difference being the inquiry question cannot be altered by the students and is pre-determined by the teacher/instructor, thereby making the early elements of the source-based process moot.



What this process strongly implies is that all inference questions have to be asked with reference to something that students are expected to infer *about*. As such, the only question from the TLG that is currently relevant to such a line of questioning and one that can be properly used to assess for inference is “what does the source tell you about...?” This question stem presents students with a definite line of inquiry about the past, in which their inferences must be shown to have addressed, i.e. through the creation of a new piece of knowledge based on the evidence that they are presented. As seen from *Diagram 2*, the process and position of inferences within the classroom (or for use in school history) is a heavily reduced and much adapted from that of the historian’s process. However, the centrality of inquiry to both train of reasoning cannot be understated.

Given the existing emphasis on the inquiry approach, the way history teachers assess for inference can be made more effective if inquiry is better integrated into the framework for formal assessment. What is demonstrated here are the clear differences between source comprehension and the skill of making inferences. The difference between the two cannot be bigger given their different positions within the (historical) inquiry process and the thought processes that are required to achieve each one. By relating formal assessments to the historical inquiry process, what this section aims to achieve is to close the gulf between teaching and assessment by contextualizing the act of making inferences within the inquiry process, thereby producing greater clarity to the purpose and nature of inferences in historical work, and allow teachers to refine the types of questions asked in formal assessment around making or drawing inferences.

Breaking down the thought process - Rethinking LORMS

Having contextualized the skill of making inferences within the wider canon of source-based skills, there is still a need to rethink the way we grade and reward student responses in formal assessments. The two prevailing methods of constructing LORMS (for the skill of making inferences) do not actually reward the various stages of making inferences. We may need to rethink and refine the way we assess for inferences and to bring the LORMS in line with the process of making proper inferences.

The two common ways of drawing up the LORMS at the moment are either based around the outcomes of the inferences or the presentation of such inferences. The first type of LORMS often break down the various levels of responses according to the “main message” or “main inference”, as opposed to a lower level “sub-message” or “sub-inference”. Within such a scheme, the levels of response are drawn up based on the varying acceptability of the outcomes of the students’ attempts at making inferences. However, it does not actually assess the skill of making inferences for two key reasons. First, it rewards the outcomes, not the process of making inferences. In a simple analogy, if this were a driving test, the current LORMS will be rewarding students based on how far they can drive when we are supposed to be interested in how they drive. This is symptomatic of a frame of thinking that is reliant on deductive reasoning. Inferences falls into an alternative epistemic framework, that of inductive reasoning – rather than dealing with absolute truths, as is common in the empirical sciences, history can only present probable narratives based on the evidence that we have available. In short, deductive reasoning is concerned with certainty, but history uses inductive reasoning that is

concerned with probabilities (Feeney & Evan, 2007).

While students are not required to be meta-cognitively aware of the difference in the two methodologies that they are required to toggle between in school, there is at the very least a need to be clear when establishing the LORMS that history is not a discipline that is built upon the same reasoning basis as that of the sciences. A LORMS that spreads out student responses according to the “message” and “sub-message” is, in effect, guilty of mapping students’ answers according to a set of response levels that is grounded in deductive reasoning, and one that attempts to create a fixed canon of acceptable and unacceptable responses without breaking down the thought processes that led to the conclusion of what is acceptable or not. The skill of making inferences has to be assessed along the lines of inductive reasoning, and points should not be rewarded for “right” or “less right” answers, but rather rewarded for students who took the steps to create more probable answers based on the evidence and contextual knowledge available.

The second type of LORMS builds itself around how a student writes and presents his or her inferences, and rewards the various levels according to the manner the response is presented, giving a higher level to a response that presents cohesive explanations and evidence as opposed to those that do not. This, too, does not actually reward the thought processes that goes on behind the skill of making inferences, but rather rewards the ability to write and present these inferences *after* they have been made. The two most common ways of rewarding points in formal assessment, unfortunately, do not actually reward points pertaining to the processes and moves behind making inferences.

Before constructing a more precise set of LORMS that models the probabilistic nature of inductive reasoning, there is a need to first examine the work of actual historians to draw inspiration as to what *making* inferences really entail. As mentioned earlier in this paper, it is often seen as a skill that is so basic and irreducible that historians and teachers alike do not delve further and question how inferences are actually being made. By examining the process of two different historians, separated by topic and era, hopefully we can further demonstrate and elucidate this issue.

The first case is Christopher Browning’s *Ordinary Men* (1992), in which he attempted to address the question of how did ordinary reservist men of the 101 Police Battalion from Germany get transformed into genocidal killers of the *Einsatzgruppen*. He observed from a piece of primary source that “among the Jews shot in our sector of town, there were almost no infants or small children,” and the primary source later added that “even in the face of death the Jewish mothers did not separate from their children”. Browning used this as a piece of evidence to establish the inference that at this early stage in the career of the German men of the 101 Police Battalion, they still subscribed to a pre-war moral code, and were not quite the senseless mass murderers that history remembered them for. Browning further illustrated his point with another eyewitness account that noted that the commanding officer of the 101 Police Battalion ordered a generous amount of alcohol to be made ready, further demonstrating how unsettling the act of shooting civilians was. All these inferences require sufficient contextual knowledge to be made. A historian will have to be aware of the role that alcohol plays in German society, and how it puts people at ease thereby extrapolating with an inference that the fact that these provisions

were made *most likely* meant that that the men of the Police Battalion did not enjoy their assignment as of this early stage.

The second case is Lee Poh Ping's work on the Chinese population in Singapore during the 19th century. Lee (1978) cited the male-to-female gender ratio as proof that the Chinese population in Singapore was a highly unsettled one, and as such, the lawlessness and chaos of the mid-19th century was not unexpected. Again, this piece of inference requires an understanding of what it means to have an imbalanced gender ratio in any society, and conversely, why do settled societies have a balanced gender ratio. Through that understanding, Lee was able to conclude *to a high probability* that the Chinese society in mid-19th century Singapore was one that was akin to a frontier town, and suffered from high crime rates and unrest.

In both cases, each respective historian was only able to, through inductive reasoning, arrive at conclusions that in their opinion were most likely what happened in the period of their investigation. That is the nature of inductive reasoning, and therefore any LORMS in the classroom will have to map out the process in which a historian or student arrives at what they think *most likely* happened. While there are no rigid procedural rules to the historical method, there are key guiding processes. What is demonstrated here is the basic process that goes towards making inferences. It is a process that always starts with the use of contextual knowledge to account for something new and that answers the inquiry question.

Therefore, the experience of other historians can be boiled down into the simple flow below, in which can be used to draw up a set of LORMS that rewards students according to the way they bring in contextual knowledge to complement the

information that is presented in the source.

Steps taken to draw cogent inferences:

1. Understanding the inquiry question.
2. Reading the source(s).
3. Summoning relevant contextual knowledge based on the inquiry question and source(s).
4. Asking how the new source(s) made sense in relation to the pre-existing contextual knowledge.

Contextual knowledge is important because it helps students and historians decide whether the inference that is being drawn is a reasonable and probable one or not, and therefore those who are able to better integrate the new information from the source into the contextual understanding of the period in question are the ones who are better able to make proper historical inferences. This could be seen from the work of the two historians that were being examined. They informed their inferences with their contextual knowledge that is "hybridized" with the source in order to answer the inquiry question.

Therefore, a set of LORMS that actually assesses the skill of making inferences should be rewarding students for introducing relevant contextual knowledge, and subsequently for integrating the source with the contextual knowledge in order to create a new or richer image of what happened in the past, hence addressing the inquiry question. The next section will show how this set of LORMS can impact the way we teach in the classroom, and improve the way inferences are being made in the classroom, and also demonstrate how such a LORMS can be operationalized in the classroom context.

Potential Implications on Classroom Instruction

Given the amount of influence that formal assessments have over the way we teach in the classroom, changing and refining the manner we assess for the skill of making inference will have undoubted spin-off benefits on the way classroom instruction is being carried out. This is because the national examinations still stand as the major checkpoint in our educational system, and with that reality, teachers do teach with a view of the formal assessment in mind. Therefore, if the way formal assessments are carried out is refined and brought in line with the inquiry approach as discussed in the previous two sections, it will most certainly change the way teachers teach in the classroom.

When teachers teach with formal assessment in mind, the thought processes behind creating probable inferences is often a casualty, as teachers turn to drill-and-practice methods and the use of writing frames instead. By rethinking the LORMS and the way we ask inference questions, it will also affect the type of drills that are produced. The LORMS and questions discussed in the previous two section will serve to close the gap between the curriculum aspirations of the inquiry approach and the process of formal assessment.

The disciplinary and inquiry approach can give students a clear grounding in the histories that they are learning about and give them a better understanding of the type of reasoning that they will have to engage in in order to come up with good and effective inferences. Furthermore, even though the purpose of history in the classroom has never been to train students to become mini-historians, by aligning

formal assessments to the inquiry approach, it also serves to transform the historical classroom into a theatre in which our students role-play as historians in order to pick up transferrable skills of history. This role-playing is useful as it serves to direct our students' thought processes and energies towards the meaningful acquisition of historical source-based skills. In the example given, students from a Secondary 1 Express class was taught to make inferences not through the use of writing frames, but rather through the modelling of the historian's craft. The emphasis of the lesson was not on how to present one's inferences after they have been made, but on how to bring in the relevant ideas and knowledge that will go towards creating probable inferences.

Accordingly, students were instructed on the following steps (see Table 1), closely following the outline of the LORMS as presented in the previous section. The students were not given the "regular" LORMS of "main message" or writing frames that would have otherwise been used when reviewing exercises in the classroom. The question that they were tasked to answer, was also informed by the discussion from the preceding sections, where the question asked had a definite and clear inquiry direction. Students were tasked to answer the following question: "What can you infer about Singapore's early years as a British colony?"

Before they were allowed to start writing their responses, they were asked to consider the following questions in the scaffolding that was provided. This scaffolding, modelled on the LORMS presented before, was designed to scaffold the thought processes rather than the writing process:

Table 1: Steps in making inferences and guiding questions

Steps	Questions posed to students
Level 1a: Identifying the Inquiry focus.	What is the inquiry question asking you to uncover more about?
Level 1b: Reading the source(s) provided.	What is the message/meaning of the source provided?
Level 2: Summoning relevant contextual knowledge primary source.	What are might I know that is relevant to the inquiry question and primary source provided?
Level 3: Hybridising contextual knowledge and the primary source.	How does the primary source fit into what I already know about the past?

The class which went through this exercise presented a clear improvement in their overall ability to make cogent inferences. Attached in Annex I are a few examples of the final responses that students came up with. Of the class of 40, 32 of them were able to make an inference that was historically relevant and meaningful, and had backed up their inferences with the evidence from the source and their contextual knowledge. This was a large improvement from the previous exercise in which only 14 of the 40 students were able to achieve something similar having only been taught using an approach that focused primarily on the use of writing frameworks. Referring to the first piece of student response presented in Annex I, what could be seen in the student’s writing is a reference to his or her contextual knowledge, in which the student identified Batavia as a major port in the region based on the content knowledge from the Anglo-Dutch Rivalry that was discussed in the classroom. The student then used that knowledge to extrapolate and conclude that should Singapore have rivalled the leading port in the region, Batavia, it likely could serve as evidence to shed some light on the importance and success of Singapore as a trading port - thereby answering the inquiry question.

However, it is important to note that this answer is built upon the understanding that Batavia was an important port, and therefore, as with the table above, by encouraging students to actively recall and factor in their contextual knowledge into their responses, it will only serve to improve the quality of student responses and likelihood of students drawing probable and persuasive inferences.

While this method does warrant further testing and refinement, it shows promise as a classroom tool to teach and assess inferences as it rewards and directly models the thought processes in which historians undergo when making cogent inferences, as opposed to merely demonstrating how to present those inferences. What is clear from this experience is that the inquiry approach has greater utility in the classroom and in formal assessment than is often given credit for. However, the potential of the inquiry approach in history can only be maximized if the process of designing and executing formal assessments is carried out with a clear reference to what the inquiry approach means in source-based work. This will thereby alter the way we ask questions in formal assessments, and correspondingly, the way we assess the skill of making inferences. However, the benefits to

instruction in the classroom should not be passed on, especially since it presents an opportunity to more accurately model the process of drawing inferences than previously carried out.

Conclusion

The current way where formal assessments are being carried out is being decoupled from the wider aspirations of the historical syllabus. This is especially true since the recent thrusts in disciplinary learning and the inquiry approach. This decoupling, in which formal assessment and the syllabus ran according to two parallel and separate logic, if bridged and reconciled has significant potential to improve the manner in which we teach and assess for various source-based skills such as that of making inferences. What I hope this paper has demonstrated are some ways – and the benefits – of closing that gap between formal assessment and the syllabus to create assessments that are more align with the historical discipline so as to improve the training of the desirable and transferrable skills.

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ⁱ Borrowing the concept of irreducible complexity from the Intelligent Design movement, it purports that each element of a certain system cannot do without another and therefore cannot possibly naturally develop and must emerge fully formed. It rings true for the process of making inferences as an inference appears to be so basic that teachers in the classroom often found themselves at a loss in breaking the process down any further.

ⁱⁱ Refer to pp. 248 – 251 of the Upper Secondary Teaching and Learning Guide.