The "4-F" Research Report:
A Strategy for Scaffolding and Synthesizing Information

Matthew W. Clayton
Springville-Griffith Institute

Introduction
Since I began teaching Regents Chemistry, I have required my students to write a research report each quarter. However, I made a number of fundamental mistakes in both the assignment and the evaluation of these reports. Initially, I created a detailed set of requirements that I then handed to each student, thinking that as long as they knew the rules, they would know how to proceed. I presumed that high school juniors (and some advanced sophomores) would know how to develop a research paper, how to gather information, and present it in a standard format. Was I wrong! As well, I assigned the report, set a due date, then proceeded to forget about the reports until the due date, figuring that the students would manage their time accordingly: working diligently, collecting research, writing outlines, refining their theses, etc. (apparently I completely forgot how I wrote papers in high school and college). Finally, I collected all of the reports on the due date, piled them up on my desk at home, and proceeded to spend the next two weeks poring over each report, making suggestions, asking critical questions, and generally editing them as manuscripts. Then, I would agonize over the content versus the format, and finally assign a numerical grade, feeling every bead of sweat the student poured into the report, and wishing to match their effort to an appropriate grade.

All of this teacher-born agony would then be reduced to the students getting their reports, flipping to the back page, and saying, "Cool, I got an 83",

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completely ignoring all of the effort I had put into assessing their text, and not even glancing at my suggestions. I was frustrated by this, but did not change the format until I read an article by a college English instructor, who stated that red marks on final copies did nothing to help the students learn! This simply confirmed what I had instinctively known, but was unprepared to accept: that I had to teach my students how to write in my class, and not expect them to be able to know what I wanted, just because it was a writing assignment.

One of the reasons I resisted this formative technique was because I mistakenly believed it would take even more time to grade the reports, since I would be reading outlines, rough drafts, and final copies, and I already was taking two weeks to read just the final drafts. But I was completely wrong! I am able to review each class's topics in less than ten minutes, and am able to review the outlines for each class in about a half-hour. The longest reading is rough draft, which I spend nearly as much time as I used to on the final drafts. But after seeing the topic, outline, and rough drafts, the final evaluation takes only a few minutes per paper; I've already read the report, and usually am only checking that the student cleaned up the mistakes from the draft. As well, the product is MUCH better—on the average, the quality of the reports is well above the reports in past years.

Step 1: Identifying the Strategy

This is a strategy for scaffolding the research process. It teaches students to think about what they are trying to learn through their research, and shows them the logical steps that will move them from concept to a finished report efficiently. Along the way, they will learn practical skills, such as finding sources of information, how to write bibliographies, and how to re-shape a thesis as they do further research. Although these skills have been modeled and practiced before, in other disciplines, high school students are not used to writing in Regents science classes. This strategy reinforces the universal concepts of proper research techniques, technical writing, and proper grammar.

First quarter, I hand out a sheet of requirements (see attached). I then take the students to the library, and have the librarian show them where to access likely information. By the end of that week, I ask for a topic and brief explanation, usually in the form of an entrance ticket. I quickly review the topics as the students work on problem sets, then I hand back the topics, with a brief comment on how to keep focused. At that time, I set a one-week deadline for a formal outline, with at least two references cited. This causes the students to continue working on the report, and helps them focus the thesis. Once again, I collect these, but this time I do it over a weekend, so I have a little more time
to glance them over. A few brief comments and suggestions, and these are returned on the next Monday, with a rough draft due by the end of the week.

Rough drafts are collected on a Friday as well, and again, read quickly over the weekend. Comments, suggestions, and general editing tips are noted, and the drafts are returned on the next Monday, with the final draft due by that Friday.

Step 2: Modeling the Strategy

When first introduced, I spend a period going over the rules and procedures. I then put the students into small groups of three or four and give each group a package of a past project that includes a topic sentence, outline, rough draft, and final report. I have each group briefly discuss the package, then exchange their package with another group, repeating the discussion. This gives them a successful sequence that they can then try to emulate. Then, each Monday before the next deadline, I display successful examples of that step to help students clarify what they need to do.

Step 3: Scaffolding the Strategy

The first quarter, I spend one day with each class in the library, looking for topics. As students find interesting articles or chapters, I help them formulate a concise statement, and then direct them to write a bibliography entry for that resource.

As they create their first outline, I point out both the appropriate formats and the deficiencies, suggesting how they can improve the outline in order to improve their rough draft.

The rough draft is the most critical "read": I point out errors, ask questions, note deficiencies, and correct grammar. I try to make as many suggestions as possible, especially on the first quarter's, to establish the quality I expect.

Step 4: Providing Additional Practice

Additional practice comes the next quarter, when the same format is followed for another paper.
Conclusion

I call this technique the "4-F" because I collect the progressive work each Friday. Total time allotted for the students to work on the reports each term is four weeks, the same as before, but the time is now much more wisely used. Because there are continual deadlines, most students stay on track, and only a stubborn few wait until the last night to crank out a mediocre first/final draft. The rest of them find out, almost unintentionally, that this method is quite efficient—they throw the outline together just to toss at me for the homework credit, but then they use that to rough out their first draft, and then they find that it's a simple process to take my suggestions to turn the draft into a decent report. Many students have commented on how easy my reports are, but in fact, they are turning out quality research writing, consistently better than I was getting in my first three years of teaching.

Suggestions for Adapting the Strategy in other Grades or Content Areas

This strategy is already general enough to use in other classes—it reinforces the standard writing format taught throughout secondary school. Only the topics are chemistry specific, so the strategy could easily be taken into another classroom.

Thinksheets

Attached are a copy of the Report Rules that I hand out before the first report, and a copy of one of the packages I show the students during the modeling stage.
THINKSHEET

SPRINGVILLE-GRIFFITH INSTITUTE HIGH SCHOOL
MR. CLAYTON’S REGENTS CHEMISTRY: 1999-2000

QUARTERLY REPORT INFORMATION

What is this?

These reports allow you to explore some aspect or application of chemical principles outside the classroom; the chance to investigate a practical chemical process used in industry, or perhaps to delve into one of the more esoteric theories we touch upon in class. The specific topic is up to you, but please have me approve your topic before you go too far—keep the discussion on the chemistry involved, not on social issues or behavioral outcomes.

Requirements

All reports must be typed, and can be done on any word processor, as long as you can hand me an adequate copy. The written reports should average at least 500-600 words in length. Note that this is a word count, not a page count, so please do not try to fool me with narrow tabs and triple spacing in an attempt to fluff up the apparent content. As well, do not equate length with a better grade; I want quality, not necessarily quantity. Do not waste my or your time writing the chemist’s version of War and Peace.

The report must contain at least three (3) specific references, properly noted in the text and listed in an “endnote” bibliography. (Get a style sheet from the LMC if you need help formatting references.) Reports should follow the standard essay format of introduction, content, and a brief summary.

Out of the four reports, you must complete at least one laboratory project, where you research a topic, create a procedural format, and perform a lab, drawing conclusions from the data collected, and answering some questions you posed before the experiment. You are still required to type these reports, and you must cite at least three references.
Requirements (continued)

Another of the four reports must be a five-minute demonstration or oral report where you get up in front of your peers and present your findings on your topic. Please create a detailed outline of your topic, and make some visual helpers in order to make your point. DO NOT READ A WRITTEN REPORT!! You should be comfortable enough with your topic to be able to discuss or demonstrate it to the class, using any props and/or any A/V aids you’ve found or created. The outline that you give to me should the same one that you plan to use in your presentation; detailed, but not a script—I want you to discuss your topic, not simply read back a dry monologue. Again, you need to cite at least three references.

Whatever you decide to do, remember that you must do at least one lab procedure, and at least one oral report out of the four assigned reports. (You might want to do the same topic from a different angle for an oral, or do a lab to further study a topic you researched, etc.) As well, I strongly suggest you get my approval on your topic before you do too much research. Please do not waste either of our time on impertinent topics.

Due Dates: Don't mess with me!

Reports are due on or before the due date. Late reports will be penalized 10 points for each calendar day they are late. THIS INCLUDES WEEKENDS!

NO EXCUSES!

As well, you will be required to turn in a topic, outline, and rough draft on each successive Friday during the month before the final due date. These steps are only worth a homework credit, but are an excellent way to get my critical help without having it lower your grade!

Remember, “4-F” yourself to a good report!

Regents Chemistry

Outline

I. Introduction
   nuclear electricity
   Ordinary Gasoline
   A) Explain - petroleum hydrocarbon fuel used principally to power internal combustion engines.

II. Characteristics
   A) Highly flammable
   B) Boiling range 30°C to 150°C
   C) Heat (calorific) value is 42.44 megajoules per kilogram
   D) Liquid at ordinary temperatures
   E) Evaporates easily in the air - what is this called?

III. Production
   A) distillation of crude oil and also by cracking,
   a) breaking up of heavier distillation products
   B) catalytic cracking
   C) oil fed in a stream of steam into a reactor vessel containing a catalyst suspended in
   fluidized bed.
   D) reaction occurs and molecules breakdown
   E) carbon deposited on catalyst
   F) regenerated in a second fluidized bed
   G) carbon is burned off in stream of air
   H) resulting carbon dioxide released into the air

IV. Composition and Use
   A) Burning properties depend on composition of
   the sample.
D) Automobile engines - tendency for hydrocarbons in gasoline range to ignite spontaneously under high temperature and pressure conditions. Composed of the alkanes hexane, heptane, and octane, may contain molecules with between 4-12 carbon atoms.

D) Uses:
   1) Automobile engines
   2) Catalytic converter

Conclusion

Sources:
Academic American Encyclopedia

Excellent start - should fill in nicely with hat you don't end up with too pg. of material.

Gasoline FAQ - Part 1-2
Gasoline

Gasoline is a petroleum hydrocarbon fuel used principally to power internal combustion engines. It is generally produced by distillation of crude oil. The origin of crude oil is from plant life up to three billion years ago. Another hypothesis suggests that crude oil comes from methane from the earth’s interior. During the early 20th century, the oil companies were producing gasoline as a simple distillate from petroleum to fuel automobile engines.

Gasoline has numerous characteristics. It contains molecules with between 4 and 12
carbon atoms. Gasoline is a liquid at ordinary temperatures and has a boiling range of 25°C to 180°C. The fuel evaporates easily in the air to form a highly flammable mixture.

Gasoline is produced by distillation of crude oil and also by the cracking, a breaking up, of heavier distillation products. Cracking can be done either by thermal means, a breaking heavy-oil fractions into smaller units, when catalytic cracking is utilized. The oil is fed in a stream of steam into a container holding a catalyst. When the reaction takes place, some carbon is deposited on the catalyst, next the carbon
is burned off in a stream of air. The left-over carbon is then released into the surrounding atmosphere.

(Gasoline depends on the composition of the sample for its burning properties. This is important for automobile engines, since some hydrocarbons have a tendency to ignite spontaneously when they are under high pressure and temperature inside an engine.

Octane number in gasoline measures the anti-knock properties of gasoline. Gasoline is primarily composed of the alkanes, hexane, heptane, and octane. Gasoline is used primarily as a fuel for automotive engines because
of its characteristic of being able to evaporate easily in the air to form a highly flammable mixture, it is perfect for the job of running an automobile.

Despite gasoline’s usefulness, there are some unfortunate consequences that come along with its use. It was found that high levels of lead in the air in urban areas can be traced directly to the combustion of leaded gasoline. There is little doubt that gasoline is full of toxic chemicals, some of which are lead and benzene. Despite these, gasoline’s biggest danger is flammability. Relative hazards should always
be kept controlled.

In order to help preserve the environment from the effects of gasoline, a few methods have been taken. In 1975, the U.S. Environmental Protection Agency issued a step to reduce lead levels in leaded gasoline by the end of 1975. The main goal was to eliminate all lead by 1988. Also, in order to control pollution levels from automotive exhaust, catalytic converters have been added to automobiles.

As you can observe from the paragraphs written above, gasoline is a widely used and valuable fuel. It has many characteristics, both
safe and hazardous.

- The process is to make a better
  situation in your summary.

- Let's just add that William and
  John, a few off-street Pavel, this should
  make up the list.

-重点是：需要提高和改进
  the process.
Gasoline

By: Kelly Niewczyk
Period 3
Mr. Clayton
Regents Chemistry
Gasoline

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Gasoline has numerous characteristics. It contains molecules with between four and twelve carbon atoms. Gasoline is a liquid at ordinary temperatures and has a boiling range of 25 degrees Celsius to one hundred and eighty degrees Celsius. This fuel evaporates easily in the air to form a highly flammable mixture.

Gasoline is produced by distillation of crude oil and also by the cracking, or breaking up, of heavier distillation products. Cracking can be done either by thermal means, or by breaking heavy-oil fractions into smaller units. When catalytic cracking is utilized, the oil is fed in a stream of steam into a container holding a catalyst. When the reaction takes place, some carbon is deposited on the catalyst. Next the carbon is burned off in a stream of air. The left over carbon is then released into the surrounding atmosphere. When the carbon is released, the resulting substance is the gasoline.

The specific properties of any gasoline mixture are unique. Its composition of any sample depends on its burning properties. This is an important consideration for automobile engines, because the hydrocarbons in gasoline have a tendency to ignite spontaneously when under high pressure and temperature, such as inside an engine. Octane number measures the antiknock properties of gasoline. Gasoline is primarily composed of the Alkanes hexane, heptane, and octane.

Gasoline is used primarily as a fuel for automotive-engines. Because of its characteristic of being able to evaporate easily in the air to form a highly flammable
mixture, it is perfect for the job of running an automobile.

Despite gasoline's usefulness, there are some unfortunate consequences that come along with its use. Lead was often added to increase octane ratings and improve fuel efficiency. It was found that high levels of lead in the air in urban areas can be traced directly to the combustion of leaded gasoline. There is little doubt that gasoline is full of toxic chemicals, some of which are lead and benzene. However, gasoline's biggest danger is its flammability. Potential hazards should always be kept under control.

In order to help save the environment from the effects of gasoline, a few actions have been taken. In 1985, the United States Environmental Protection Agency issued a step to reduce lead levels in leaded gasoline by the end of the year. The main goal was to eliminate all lead by 1988. Also, in order to control pollution levels from automotive exhaust, catalytic converters have been added to automobiles. Lead was also removed because it clogged the converters.

As you can observe from the paragraphs written above, gasoline is a widely used and valuable fuel. It has many characteristics, both safe and hazardous. Gasoline will play a large role in the lives of many in the near and far future. If we were to ever run out of gasoline, many lifestyles would be altered and forced to change. Let's just hope there is still a long time before this would ever happen.
Sources:


Gasoline FAQ- Part 1 & 2


Tons of great info in a clear sequence.

It cleaned up nicely!

Bio: real-wealthy format!

Log in style sheet

Not referenced to text