Magically Improve Your Learning, Retention, and Exam Scores – Without Using Any Magic

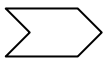
Marc Siegall, PhD

Department of Management – California State University, Chico

Do you:

- Get frustrated that all of your hard work preparing for exams – reading, studying, reviewing, etc. – does not pay off?
- Finish taking an exam, walk out of the classroom, and then have the answers to one or more questions suddenly come to mind?
- Learn the definitions of new words, but miss the real meaning of what you've been reading?
- Want to take something with you after graduation (other than debt), as a result of the time and money you spent on college?
- Want to learn how to be more successful in your college courses and in your career(s) after college?

I think I can help. If you read and PRACTICE the following techniques, you will learn more and do better on exams. You will do this by developing better learning habits, and making better use of the time you spend on preparing for classes. As an extra treat, you will feel less stress during exams.



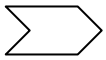
Learning a better way to learn will pay off for you long after you've walked at Commencement and moved from the "surreal world" of the university, into the "real world" of the rest of your life.

"D" is for Done

There are two basic ways of getting through college. Which one sounds more like yours?

> Model 1: You try to figure out what will be on the exam – by focusing on what's in the study guides, trying to read the professor's mind, finding old exams, talking with students who've already had the course, etc. – and then try to memorize only that material.

Model 2: You do your best to learn the material in the course, realizing that your knowledge will be spot-checked via exams (and other assignments). You make your own study guides as you go along, and ask the professor if there's something you don't understand.



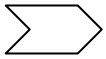
Model 1 often is the dominant model. If it's your model, ask yourself: Does it actually work? Do you do better than "just barely good enough?" Do you know students who use Model 2, and find that they do better and are more satisfied? Perhaps, as a side-effect of improving your learning habits, you will choose to move from Model 1 to Model 2.

If you already believe in Model 2, then these techniques can help you increase your success with it.

What This is Not

What follows is not about "tricks," such as mnemonic devices (which can be very useful for certain purposes). It's not about how to learn definitions – which often is a matter of brute force memorization.

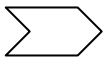
What This Is



This document is about learning how to learn, capitalizing on two things we know about how brains remember things:

1. The development of knowledge structures, neural networks, organized chaos – whatever you'd like to call it.

2. Repetition, not flashcard-like memorization, but keeping these knowledge structures alive and "energized."



We'll cover four **Basic Principles**:

1. Developing a knowledge structure – building a foundation for learning the material.

2. Energizing the knowledge structure – expanding upon that foundation and learning the details by getting your brain actively involved.

3. Keeping the knowledge structure energized – constantly refreshing that knowledge so that it stays with you.

4. Reducing stress – getting what you know from the inside of your head down onto the exam's answer sheet.

My Brain Hurts

Well, it shouldn't. For one thing, there are no actual pain receptors inside your brain. For another thing, learning how to learn is not difficult. What's difficult is breaking yourself of the studying habits you've built up over a decade or so, and making new habits of a better way.

Knowing How to Structure for Knowing

Basic Principle Number One is developing a knowledge structure. Let's start with how you do the reading assigned for your class. I'm assuming that you actually DO the reading. If you don't, START. You'll be amazed how much you can learn by doing the homework.

The first step in the right direction is easy: Have the material read by the time the professor wants you to have read it. In short, **DO YOUR READING ON TIME**. You'll see below why that's a good idea.

Alright, let's say that Chapter 95 is assigned to be read by next Monday in your Galactic Philosophy class. We already know that you should have Chapter 95 read before you walk into the classroom on Monday.

When should you start reading Chapter 95? The simple answer is: early enough so that you have time to do it right.

How to Read

First off, you need to **create an appropriate physical environment** for learning. There are many useful resources out there on this topic. A simple web search will turn up all sorts of good ideas. I recommend Learn How to Study and SOAR to Success, by K.A. Kiewra, for helping you to improve your whole learning system.

Alright, you are nice and cozy in your studying environment. You open the book to Chapter 95. What do you usually do? Do you start with the chapter's first page, and then read, page by page, to the end?

If so, how does that work for you? How often do you find that your eyes have moved over three pages, but you haven't a clue what it was you read? Even if you don't zone out, how often do you finish a chapter with a firm understanding of the MEANING of what you've read?

The little bits of information, the details you're trying to grasp by reading Chapter 95 from start to finish, are like leaves on a tree (see Figure 1). If you take a bunch of leaves

and try to glue them where they belong on that tree, they'll just fall to the ground (see Figure 2).

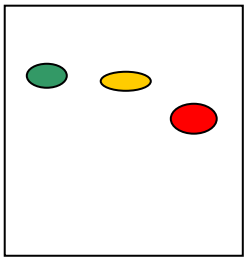


Figure 1
Leaves

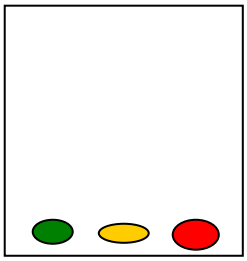


Figure 2
Fallen Leaves

You first need to have an actual tree – trunk, limbs, etc. – onto which you can attach your leaves (see Figure 3).

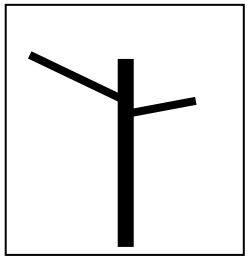


Figure 3
The Tree

This tree is the heart of the knowledge structure that you will build out of the material in Chapter 95.

The idea is to get a sense of where the authors want to take you, to give yourself an understanding of what the chapter is about, before trying to remember everything within the chapter. Start growing your tree before being overly concerned with sprouting leaves.

Today's textbooks usually make this step – generating a basic knowledge structure – very easy. Here's how:

Read the "Goals for this Chapter" – or whatever your textbook calls them – that are on the first page. Read the introductory paragraphs that explain what the chapter is going to cover – I'm not talking about any "introductory example" – I'm referring to what the authors have written about the purpose of the chapter.

Next, read all of the major and minor section headings in the chapter. Even better, read the first sentence or two – no more – under each section heading.

Finally, read the bit at the end of the chapter that is a short concluding section, or a repeat of the learning goals, or whatever it is that the textbook authors have put at the end to tell you what they think they've just brilliantly communicated to you in the most exciting 35 pages ever written (except for Chapter 96, which will be even better).

This is your tree, the trunk and limbs in Figure 3. It is **a basic knowledge structure that helps you organize and remember all of the little bits of detail you will try to glean from the chapter.** NOW go back to the first page of the chapter, and start reading for content. Here's where you'll start taking notes and practicing the other elements of this learning process.

You've given your leaves (see Figure 4) someplace to stick to. (For English majors: Someplace to which to stick.)

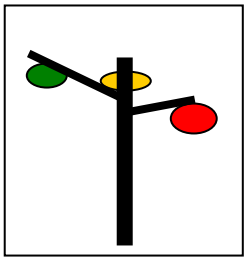


Figure 4
The Leaves Have Someplace to Stick

Alright, we're back to the first page of Chapter 95, reading for detail. How can we do that better?

Remember to Process, and Process to Remember

Keep in mind (no pun intended) that the idea here is to form a structure in your head onto which you can attach new ideas that will stick, that will stay with you. At this point, we move into **Basic Principle Number Two: Energizing the knowledge structure** – expand upon that foundation and learn the details by getting your brain actively involved in your learning.

Simply put, THINK ABOUT WHAT YOU'RE READING. Can you relate a new idea to something you already know? Can you think of a personal experience that illustrates what you've just read? Is there any emotional impact, good or bad, to an idea in the chapter? Is there something confusing? (We'll touch on this bit in a minute.)

Make this new tree more than an isolated sapling. Try to make it part of the vast forest that's already in your head. Imagine the other trees in the forest as helping each other keep their leaves from falling (see Figure 5).

Everyone's most elaborate knowledge tree is about….themselves. If you can relate a new idea to something that's already part of your life, you can increase the odds of your remembering the new idea.

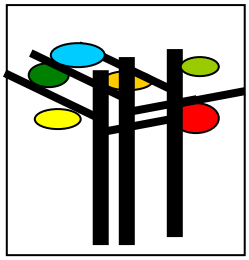


Figure 5
Your Knowledge Forest

Back to the main point of this section: The more you force your brain to PROCESS the information in Chapter 95, the more you will remember it. What are other ways of getting this processing to happen?

Striking the Right Note

I bet you take notes on what you read. At least, I bet you think you take notes on what you read. Maybe you use a color marker – or have a complex color coding system – for highlighting important passages. Maybe you outline the chapter as you read it. Maybe you write flash cards. Maybe you do all of these things.

Maybe there's a better way to do it.

First off, the mere act of actually writing notes is another way of getting your brain to process and remember the information.

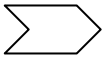
Sorry for you laptop note takers, but research seems to indicates that typing your notes straight from the book does not help much with retention. Outlining the chapter doesn't work very well, either. Why? Because you are not actually thinking about – processing – the material. Typing or simple outlining bypasses what are, for our purposes, the important parts of the brain. Basically, it's fairly mindless.

Try this:

Read a chunk of the chapter. Not a big chunk, maybe just the few paragraphs that follow one of the sub-headings. Now, close the book. Write down, in your own words, what you've just read. (Laptop users may resume typing, as long as they are processing what they're typing.) Reopen the book, and compare what you wrote with what's in that part of the chapter. If necessary, fix your notes.

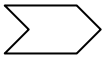
Look at how much "brain processing" this form of note taking uses. Look at the beautiful notes you are creating for yourself. Look at how much better your later reviewing of

these notes will help you prepare for the test. Look, up in the sky, it's a bird, it's a plane, it's…..oh, sorry, back to business.



Problems? Something hard to understand? Something not seem to fit with other things you've learned? Something seem counter to the previous lecture? Go see your professor. That's what we're paid for; that's why we have office hours. Or, write yourself a note to ask the question in class. Professors love to have students ask questions that show they're engaged in the material. Your fellow students will love it that someone had the guts to ask the same question they've got.

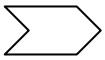
Stop highlighting stuff in the book, unless it's to mark a definition to come back to for rote memorization, or unless it is a VERY IMPORTANT idea that you want to reinforce for yourself. Do NOT rely on the multicolored remains from the previous owners of a used textbook. After all, were these the "A" or the "D" students?



Keep building your tree, but don't lose site of the tree for the leaves, or the forest for the trees. **All of this works only if you can keep the big picture in mind as you work on integrating the details.**

Sorry, I Didn't Hear You

Do you know what your dominant learning style is? Do you better remember things you see or things you hear?



If you mainly are an auditory learner (remembering things you hear more than things you see), then you darn well better find a way of hearing the material. You need to get that listening part of your brain involved. A simple way is to read the material out loud to yourself. Not only will you be able to hear it, but you've just engaged your brain in more processing of the material through the act of reading aloud.

More of a visual learner? Try to picture the textbook page as you write your notes. More processing – more learning.

A Little Help from Your Friends

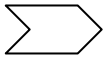
Another great way of learning new material is to work with others who are trying to do the same thing. I bet that you've already found out that you learn more in a study group when you have to help someone else learn an idea, than when you need someone to help explain it to you. Why? In order to get that material ready for your mouth to say it, your brain needs to organize it. More processing. More organizing. More learning.

By the way, beware of falling into the trap of thinking that having heard someone explain a concept to you, that you understand it. Hearing it is not the same as processing it.

Lather, Rinse, Repeat

You've gotten all of the wonderful new information into your head. How do you keep it there? **Basic Principle Number Three: Keep that knowledge structure energized, constantly refreshing it so that it stays with you.**

In other words, keep going over your notes.

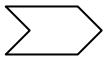


As often as possible, review all of your notes. Perhaps more realistically, review all of the notes that pertain to what will be on the next exam. DO NOT WAIT UNTIL A DAY OR TWO BEFORE THE EXAM.

Consider what one of these review sessions will be like. Let's say that Chapter 95 is the first chapter right after an exam, and is the beginning of the new material to be on the next exam. You've already spent a lot of effort – very valuable, well spent effort – on making your notes for Chapter 95. How long is it going to take you to read them over again?

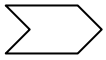
Next, you read Chapter 96, using all of the above techniques. Tonight is "note review night." You're now seeing Chapter 95's notes for the third or fourth time – remember, you looked at them a few times just in the process of creating them. Going through them again shouldn't take much time, then you review your notes for Chapter 96.

A bit later, you've added Chapter 97 to your mental library. It's review time. You've almost got Chapter 95's notes memorized, you're well on your way with Chapter 96, and you get to visit with your brand new friend, Chapter 97.



Do this nightly. Too unrealistic for your busy schedule? Do it at least three times a week. **If you don't, you're wasting everything you've invested so far.**

I Haven't Got Time for All of This



Of course you do. Remember all of those long hours you used to spend in the day or two before a test? You've just taken all of that time and spread it out nicely over the past few weeks**. If you stick with the above system, the night before an exam should be no different than any other "note review night." Why? Because you've already taught yourself the material.** You're now following Model 2 of "Getting Through College."

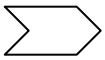
Umm, Where Are We?

You've built for yourself a basic knowledge structure for the new material. Onto that structure, you've added the necessary details. You've learned how to be an active learner, keeping your brain engaged in this whole process. You know to help your brain by frequently reenergizing that wonderful new knowledge structure.

What About the Time I Spend with Whatshisface, You Know, the Professor?

Ideally, the time you spend in class serves to (1) reinforce the main ideas from the reading, (2) go into more detail on certain ideas introduced in the reading, and/or (3) introduce new concepts that are related to the material in the reading. These goals are accomplished through case analyses, discussions, quizzes, straight lecture, et cetera.

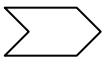
What do you do with it?



First off, there are many good resources for how to take good lecture notes. The Appendix offers some ideas. The "SOAR" book I mentioned above has lots of details about taking and organizing lecture notes.

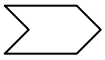
Second, since you're reading BEFORE the lecture, you are ready to be thinking about how the lecture material fits into what you've read. Having a bad week, and not been able to prepare the chapter properly? Then, at least do the basic overview process, to get the Big Picture of the reading, prior to the lecture.

Just as you want to be an active reader, you want to be an active participant – or, at least, an active listener – during class. Use the same tools that you're developing for actively learning from the readings. How does the in-class material relate to what you've read? How does it relate to other things you've learned? How does it relate to a personal experience? How does it add a new leaf to your tree?

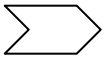


Then, as soon as possible after class, integrate your class notes into your reading notes. These things are supposed to be reinforcing each other. If there's an apparent conflict or disconnect, you've got another reason to go talk with the professor or ask a good question at the next class session.

Hooray for Me!



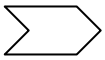
If you are doing all of this correctly, you no longer have to use huge chunks out of your life in order to do the reading and cramming in the days before an exam, and you'll be a lot more confident in your ability to do well on the exam.



Much more importantly, you will remember the material long after the exam and the course. There's an old rule of thumb: The longer it takes you to learn something, the longer it takes you to forget it. Sure, some students – maybe even you – can put off the work, cram, do alright on the exam, and then move on….forgetting within a day everything they thought they knew for the test.

We're operating with the assumption that you want to take something with you from your coursework. In addition to learning the material, you also will get better grades.

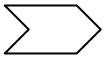
It can take some time to learn this approach, and it will take some effort to stick with it.



Try not to get frustrated if it doesn't pay off immediately, because you may be making a big change in how you approach your studies.

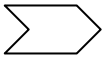
You Said Something About Exams?

Yes. I said that "you'll be a lot more confident in your ability to do well on the exam." **This confidence will reduce the stress (and maybe anxiety) you feel during exams, which itself will help you score higher.** Don't believe that you feel stressed when taking exams? Go back to "Do you often finish an exam, walk out of the classroom, and then have the answers to one or more questions suddenly come to mind?" If that's happened to you, then you've been stressed during the exam.



Stress causes a lot of physiological and psychological changes to you. Simply put, it makes it harder for you to remember what you've painstakingly worked to get into your head, and it makes it harder for you to think clearly during the test.

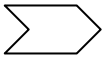
There are certain skills and tricks in taking multiple-choice and essay exams. There are many good resources for learning "how" to take exams effectively. This will not be one of them. Instead, our focus here is on how to reduce the stress that gets in the way of those effective exam taking methods. In my decades (yikes!) of experience as a college professor, the **biggest reason I've seen for students not doing well on exams – assuming that they've actually learned the material prior to the exam – is stress.**



Personally, I do not want to test how well you can cram for an exam, or how much you can get yourself mucked up during the exam by stress.

Stress Kills (Film at 11:00)

To keep things from getting too overwhelming, I'm going to cover just four basic tools for reducing your exam stress. There are many others.



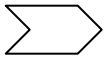
The general idea is to keep yourself from falling into a downward "stress spiral." Ever experience getting stressed over something, which causes you to screw up, which creates more stress, which leads to even bigger screwing up, and on down until you flatten yourself on the pavement below? (This is all figuratively speaking, of course.) We're dealing with **Basic Principle Number Four: Reducing stress.**

Let's take an exam together.

Tool #1 – Build on Success

Once you get the test into your sweating hands; what do you do with it? I mean *after* you see you life flash before your eyes. Start with question #1? Sounds good. What if you don't know the answer to question #1?

Do NOT keep working at it until you get it. Do NOT start the exam by creating more stress for yourself. Move on. Number 2 a little iffy? Go to number 3. In fact, keep going until you hit a question where you are very confident about the answer. Then go to the next question about which you have a lot of confidence. Eventually, cycle back to the questions you by-passed.



Remember: Stress gets in the way of your brain functioning the way you need it to. Your ability to recall information is reduced. **Start with a "win." As you build on success, your confidence increases and your stress level decreases.** The elusive answer to question #1 might now not be so elusive.

In general, are you better at multiple-choice or essay questions? If your exam includes both types of questions, again, start with your strengths. There's no rule that says you must answer the questions in order, or that you have to do the multiple-choice/essay questions before you move on to the essay/multiple-choice questions.

Try to keep yourself from falling into the stress death spiral.

Tool #2 – Be Your Own Best Friend

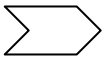
During an exam, do you ever catch your inner voice telling you things like, "Gee, you're an idiot," or "Dummy, if only you'd studied more," or "You can kiss THAT career goodbye," or "You know they're all out to get you, right?"

Let's ignore that last little inner message for now. If someone was telling you these things while you were taking the test, you'd be pretty upset, wouldn't you? You'd be particularly upset if you believed them to be true. In fact, it would stress you out.

We all spend a lifetime developing these inner voices, and it's not a simple matter to turn them off. In fact, the more you try to shut yourself up, the more that inner voice is likely to get louder. Dealing with negative self-talk is very difficult. This particular tool is the hardest of the set to use.

Imagine that you are sitting next to your best friend, who is taking a test. You are not taking the exam, but are able to talk to your friend. What would you say? "Don't sweat, you can do this," or "You know this stuff, just relax," or "There's plenty of time, no need to feel that pressure," or "You're smart, and I believe in you?" It sure wouldn't be "Gee, you're an idiot."

We may not be able to turn off that inner voice, but we might be able to "change the channel." Don't try to shut off your inner dialog, instead have a conversation with your best friend: you. (At least pretend it's you. If it's not, you can spend years in psychotherapy *after* graduation.)



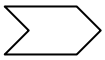
Make that self-talk positive. Again, this might be very hard to do, but it can have a big pay-off if you're successful. And remember, as with any new skill, it may take time to master.

Tool #3 – Change Your Physiology

Stress changes our body chemistry. It affects our brains, not just our minds. Therefore, if you are able to take a moment to reverse some of that negative chemistry, you can reduce your stress level.

Take a deep breath, hold it for a second or two, and then slowly release it. No, I mean it, do it now. How did it feel? Hmm….let's try it again, only this time, we'll use a little imagery to help do it right.

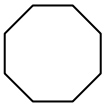
Sit up squarely in your chair, with your feet flat on the ground. You're going to take another breath, hold it for a second or two, and then slowly release it. This time, however, try to breathe in and out *through your feet.* I know that might sound silly, and some of you may not be able to capture that imagery, but try it. Yes, NOW. How'd that feel?



Probably, the first breath you took involved breathing from your chest, from the top of your lungs. The "through your feet" imagery helps you to breathe from your diaphragm. It's that deeper "from the stomach" breathing that changes your body chemistry. You should feel more relaxed after one or two of those breaths. Don't do more than two, or you might start to hyperventilate (I'm not kidding).

Ever play a wind instrument? Sing in a choir? Swim competitively? Do yoga or meditation? If you have, you've already learned how to breathe properly. Now, you need to remember to breathe that way during an exam.

Tool #4 – STOP STOP STOP STOP STOP!!!!



If you find that you're getting lost in a downward stress death spiral, STOP!! Put down your pen or pencil. Close the exam. Break off your attack.

Take a couple of the deep breaths. Try some positive self-talk. Think about what you're going to have for dinner.

Break the downward cycle, take a moment to center yourself, try to lower your stress level. Even if you only go from "utter panic" to "I wonder if they're hiring at Burger

Barn," you are reducing stress, increasing your ability to do better, and giving yourself a chance to build an *upward* spiral of confidence and success.

And Then, Tell Them What You Told Them

You might be fighting many years of getting by with poor study habits and skills. This does not mean that you have not been trying hard or that you are unintelligent. Somewhere along the line, you picked up these skills and honed them, because they worked for you – at least they worked well enough.

For all of your money, time, bypassed opportunities, blood, sweat, and tears, you want to leave college with more than a transcript full of course titles and grades. You want to learn more than just what's on the exam. At least I hope that you want these things.

Build those knowledge structures, populate them with the details, get them energized, and keep them energized. After you've spent all of that effort on getting the information into your head, get rid of that big stress block to exam success. You deserve a reward for all of your learning, which, in this context, as imperfect as it may be, is a good grade.

For Further Reading

It's not like I came up with all of this stuff on my own. You can find additional useful material by doing web searches, looking for phrases such as "taking lecture notes." There's a useful outline that covers points similar to those in this document at http://www.rio.maricopa.edu/distance_learning/tutorials/study/textbook.shtml?printversion. There's Kiewra's "SOAR" book I recommended on page three. (No, I don't get a percentage of the profits. Well, not a *large* percentage.)

Finally, don't forget that there are many learning support services on campus – including your professors.

Appendix

Student Guidelines for Taking Lecture Notes Using the Recall Clue System

Before the Lecture

1. Read the required assignments in your textbook.
2. Review any notes you took in the previous class session.
3. Write down any questions about the homework reading or assignments that you want to ask your instructor during the next day's lecture and discussion.
4. Come to class ready to take notes. Bring a binder with enough paper and a pen.
5. Sit near the front of the class to better see the board or screen and better hear your instructor.
6. Keep a separate section in your binder for each class.
7. Get your paper ready to take notes. Draw a 2" margin on the left side of the page.
8. Write the date and name of the class at the top of the page.

During the Lecture

1. Use a blue or black ink pen instead of pencil to take more legible notes.
2. Use standard 8-1/2" x 11" paper.
3. Use only one side of the page in taking notes.
4. Write the topic of the lecture at the top of the page.
5. Write down the main ideas of the lecture on the right side of the page. Save the 2" column on the left to write down your recall clues after the lecture.
6. Only write key words and phrases; don't try to copy your instructor's exact sentences.
7. Write down any examples your teachers or classmates use.
8. Write down any new terms your teacher defines.
9. Use abbreviation whenever possible.
10. Write as neatly as possible.
11. Leave plenty of blank space between ideas so you can add missing information after asking the teacher a question or asking a classmate for help.
12. Ask questions during the lecture if you don't understand something. You can also write a question mark next to any ideas that are unclear. Later you can ask your teacher or a classmate to explain this idea.

After the Lecture

1. Edit your notes immediately after the lecture to remember more facts and examples.
2. Underline important new words and important ideas in your notes.
3. Fill in the left margin with words and phrases that briefly summarize your notes. These recall clues should be word that will help you remember the complete information in your notes. You can also write questions in the left margin.
4. To study for a test, cover your notes with a piece of paper, showing only the recall clues in the left margin. Read the first recall clue and try to remember the

information in the notes beside it. Then slide the paper down and check that portion to see if you remembered all the important facts. If you remembered only part of the information, cover up your notes again and try to remember.

Sample Lecture Notes

U.S. History
11/2/07

	Early U.S. Immigration
Def. of "immigrants"	immigrants = people who come to a new country to settle and live
only non-immigrants to US	only non-immigrants = Native American Indians
immigrants in 1700s & where they lived in US	immigrant groups in 1700s and where they settled: Spain: SW England: E Coast N & W Europe: E Coast Descendents of E coast people fought for independence from England
immigrants in 1800s and why they came	1800s – reasons for immigration: 1. religious freedom (same as Pilgrims in 1620) 2. political freedom – a democratic country 3. Europe had bad crops & not enough food e.g. bad potato crop in Ireland
difficult lives	reasons life was difficult for early immigrants 1. many educated, but didn't know English 2. some with little education & job skills 3. forced to take factory & building jobs: hard physical work, long hours, low pay
Immigrant jobs	jobs different immigrant groups had: 1. factories in NE: Ireland, Italy, Russia, Poland 2. railways and bridges in W & farming: Chinese 3. farmers & business in Great Plains: Germany, Norway, Sweden