Transfer of Learning with Interactive Fiction

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http://bdesilets.com/if (You'll find the PowerPoint at this Web address.)

Please feel encouraged to participate in this session, by raising your hand or using the chat.

Introduction

LEARNING X TRANSFER = RESULTS

- Transfer as the point of education (Grant Wiggins)
- Transfer as a commonly-achieved goal
- Transfer as an extraordinary challenge
- Creating interactive fiction, especially with Inform, is a clear and powerful starting point for transfer.
- Problem-solving in (especially) parser-based IF is an unusually-rich source of transfer activities. It's also the principal focus of this presentation.

Swartz Model: Teaching for Thinking and Transfer

Introduction

Students are prepared for the lesson content, thinking skill and learning topic, by introducing them to the content objectives and the title of the lesson, by introducing them to the thinking skill, and by clarifying the importance of the thinking process.

Sample Thinking Skill: Restating Problems to Facilitate Solutions

An IF Example: Restating a Problem

◈ Outside

◈ Grunk think that pig probably go this way. It hard to tell at night time, because moon not bright as sun. There forest to east and north. It even darker there, and Grunk hear lots of strange animal.

>go east

◈ Forest look dark. Pig probably some place in there, but Grunk not know which way to go. Not want end up lost in forest with no pig.

◈ >listen

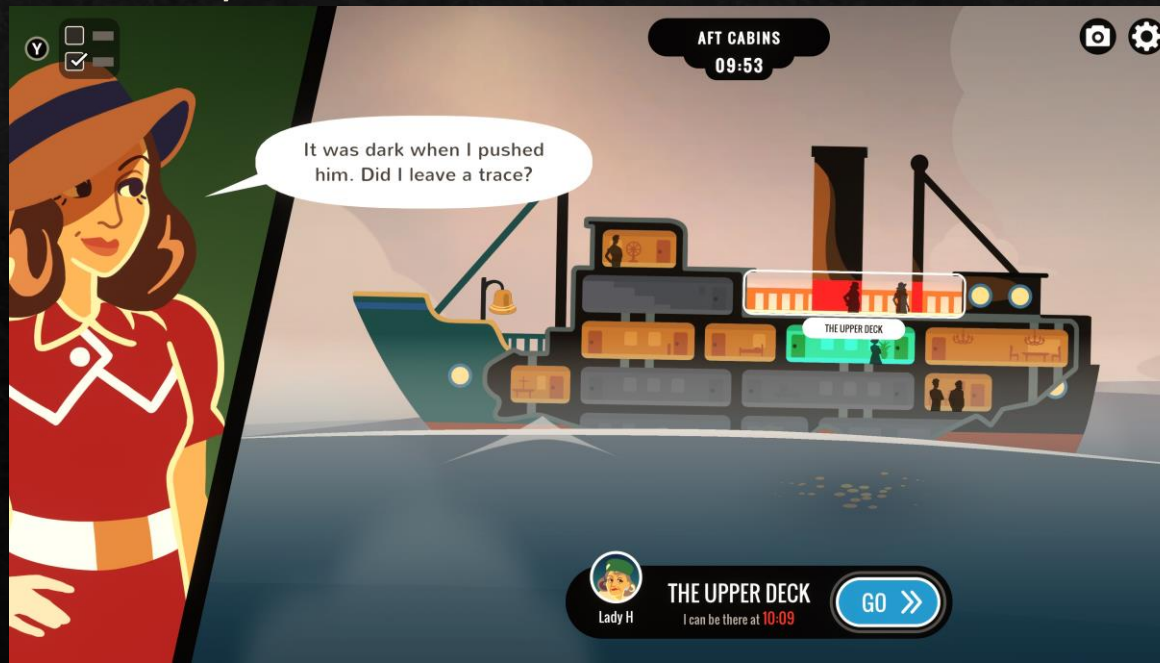◈ Grunk get quiet. Listen for noise in dark.

◈ >listen

◈ Grunk hear noise! It come from some place in bushes, but Grunk not sure which way it come from.

Choice-Based IF

◈ Some choice-based IF offers lots of problem-solving, too.

◈ *Crème de la Crème, Birdland* – Not so much

◈ "Bigger Than You Think," "Overboard!," and "16 Ways to Kill a Vampire at MacDonald's" – Plenty of Problems!

Preliminary Definition of Transfer

◈ **Transfer of learning** occurs when people apply information, strategies, and skills they have learned to a new situation or context.

◈ Some contexts are more similar than others

  ◈ More similar

    ◈ Transfer of identifying a theme from one poem to another

  ◈ Less similar

    ◈ Transfer of identifying a theme from a poem to a political campaign

Swartz Model for Teaching with Transfer

Active Thinking

The main objective of the lesson should be to link and integrate the thinking skill in a specific and clear manner with the content where students are directed to graphic organizers and verbal instructions that fall within the thinking process or skill.
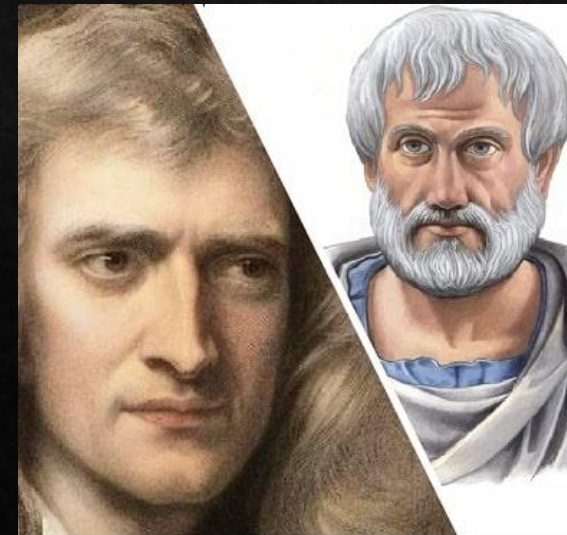
Example: Students explore how restating a problem works in solving "Lost Pig" Puzzles.

Problematic Examples of Failure to Transfer

◈ MCAS
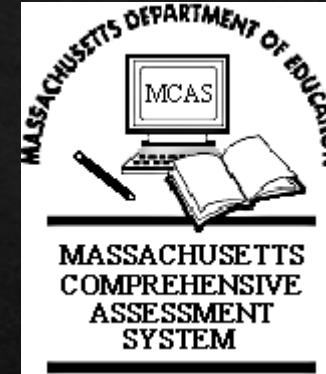
◈ Aristotle and Newton

MCAS Example of Failure to Transfer

(Circa 2008)

◈ Here is an excerpt from non-narrative selection, a 17-paragraph piece on colorblindness:

Unlike left-handers, however, we seem disinclined to rally round our deviation from the norm. Thus there's no ready source of information about how many presidents, or military heroes, or rock singers have been colorblind. Based on the law of averages, though, there must have been some. We are everywhere, trying to cope, trying to blend in. Usually we succeed. Until someone spots our purple bluebirds. Then the jig is up.

MCAS Example Question

Here's one of the questions:

This selection is best described as –
A. a biography.
B. a scientific article.
C. an essay.
D. an investigative report.

This was the hardest question on ANY 10th grade MCAS test, in four subjects, that year: only 33% got this one right.

It's an essay.

"But it didn't have 5 paragraphs!" complained many students.

Is this an example of failure to teach for transfer? Is there a simpler, more probable explanation for the odd result?

Aristotelean Physics Example

A group of people has just finished a course in Newtonian physics. If you ask these folks some simple questions about the motion of objects, such dropping of a rock to the ground, most of them will not answer in Newtonian terms. Instead, they'll answer in terms of Aristotelian physics. Apparently, the learning about Newton's physics has not transferred well.

Is this an example of failure to teach for transfer, or is something else going on here?

Aristotelian Physics and an Ordinary Context

◈ Aristotelian physics is a correct and non-intuitive approximation of Newtonian physics in the suitable domain (motion in fluids), in the same technical sense in which Newton's theory is an approximation of Einstein's theory.

◈

Carlo Rivelli, "Aristotle's Physics: a Physicist's Look"
https://arxiv.org/abs/1312.4057

Swartz Model for Teaching with Transfer

Thinking About Thinking
By asking students direct questions about their
thinking, the teacher encourages them to reflect on their thinking
style and its effectiveness.

Example: Students reflect on their experience with restating
problems in "Lost Pig," eventually listing some steps that lead to
productive restating.

Advanced Definition of Transfer

[Transfer is] the ability to extend what has been learned in one context to new contexts. Educators hope that students will transfer learning from one problem to another within a course, from one year in school to another, between school and home, and from school to workplace. Assumptions about transfer accompany the belief that it is better to broadly "educate" people than simply "train" them to perform particular tasks.

From Chapter 3 on 'Learning and Transfer' from the book *How People Learn* from the National Academy of Sciences (https://nap.nationalacademies.org/read/9853/chapter/1)

Suggestions Based on Research on Transfer

◈ **Establish and keep highlighting clear transfer goals.** Explicitly and regularly alert learners to the goal of transfer. Why? Because most students do not realize that this is the goal of learning in school.

◈ **Have students constantly generalize from (increasingly challenging) specific instances and cases:** Transfer is about using helpful 'big ideas' to find familiarities and connections where others see only newness and difference.

◈ **Require students to constantly re-word/re-phrase/re-present what they learn.**

https://grantwiggins.wordpress.com/2012/01/16/the-research-on-transfer-and-some-practical-implications-transfer-part-2/

Christopher Fee Video on and Inform Project
https://www.youtube.com/watch?v=O4qXjjakyGA

Teaching for Thinking

◈ "Broadly Educating" people requires teaching for thinking, and

◈ So do the "Suggestions Based on Research on Transfer,"

◈ And so do most of the nationally-promulgated standards and goals for education, such as the English "Targets" and the U.S. "Common Core."

Swartz Model for Teaching with Transfer

The Application of Thinking

Activities are practiced by students to ensure the transmission of training impact by applying the skill to different content while minimizing teacher intervention.

IF and Transfer in General

◈Need for Transfer from Interactive Fiction

◈Suitability of Interactive Fiction, especially Puzzle-Rich IF, for Teaching for Transfer

Teaching for Thinking – Identifying Target Skills

◈ Teaching for Thinking Scholarship

　◈ Robert Sternberg's "How Can We Teach Intelligence?"
　(http://www.robertjsternberg.com/successful-intelligence)

　◈ Robert Swarz and David Perkins "Nine Basics of Teaching Thinking"
　(https://www.academia.edu/18468371/The_Nine_Basics_of_Teaching_Thinking)

◈ Educational Standards

　◈ Common Core (United States, Forty-one of Them, Anyway)

　◈ English National Curriculum

Sternberg' Componential Theory of Successful Intelligence

◈ Metacomponents

　◈ Higher-Order or "Executive Components"

　　◈ Plan, Monitor, and Evaluate Our Thinking

　　◈ Examples: recognizing the existence of a problem, defining the nature of the problem, and mentally representing information about the problem.

◈ Performance Components

　◈ Implement the Instructions of the Metacomponents

　◈ Examples: inferring relations, applying relations

◈ Knowledge-Acquisition Components

　◈ Examples: selective encoding (deciding what information currently available in a problem is relevant for one's purposes) and selective comparison (deciding what prior information stored in memory is relevant for one's purposes).
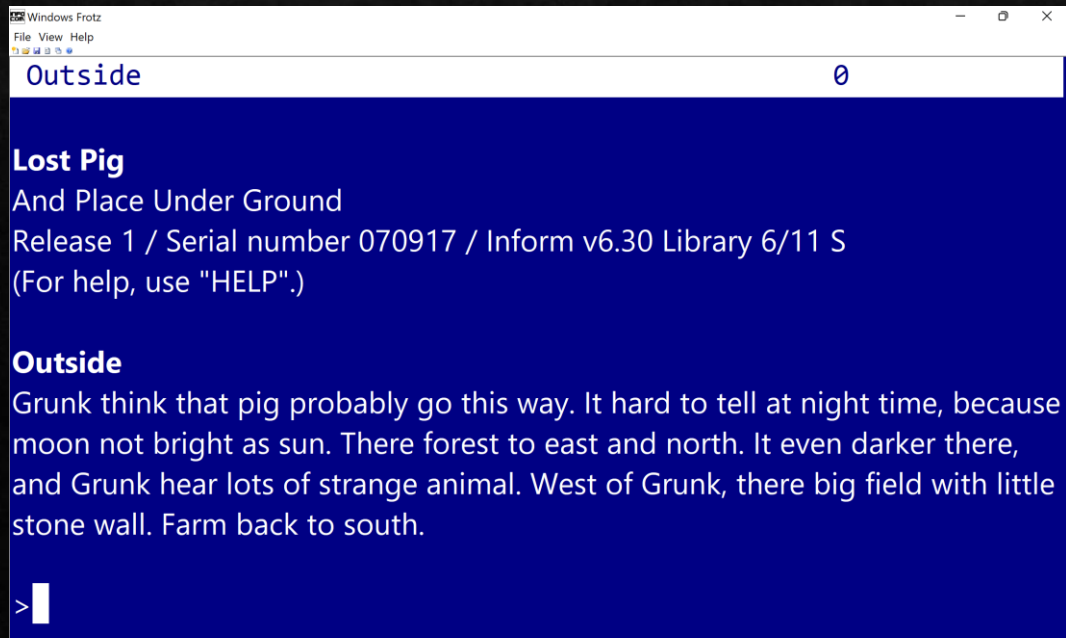
Swartz and Perkins: Examples of the "Nine Basics"

◈ How to Improve Thinking – Thinking Organizers

◈ Where to Improve Thinking – Infusion into Content-Area Instruction

◈ Attention to Skills, Processes, and Dispositions

◈ The Importance of Explicitness

◈ Attention to Metacognition

◈ Teaching for Transfer

Self-Testing Mechanisms for Comprehension and Transfer

- [The four strategies chosen were:] questioning, clarifying, summarizing and predicting…. They serve an interesting dual function, if used intelligently; they both improve comprehension and afford the alert reader an opportunity for monitoring understanding.

- Brown & Palinscar (1989) "Guided Cooperative learning" in *Knowing, Learning and Instruction: Essays in Honor of Robert Glaser*, ed. by Lauren Resnick

Self-Testing in Parser-Based IF

◈ The readers can't "turn the page" unless
they've solved the current problem,
they're looking for more information on the current problems(s), or they're
moving on to a new problem.


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Windows Frotz                                          □ ×
File  View  Help

Outside                                                      0

Lost Pig
And Place Under Ground
Release 1 / Serial number 070917 / Inform v6.30 Library 6/11 S
(For help, use "HELP".)

Outside
Grunk think that pig probably go this way. It hard to tell at night time, because
moon not bright as sun. There forest to east and north. It even darker there,
and Grunk hear lots of strange animal. West of Grunk, there big field with little
stone wall. Farm back to south.

>
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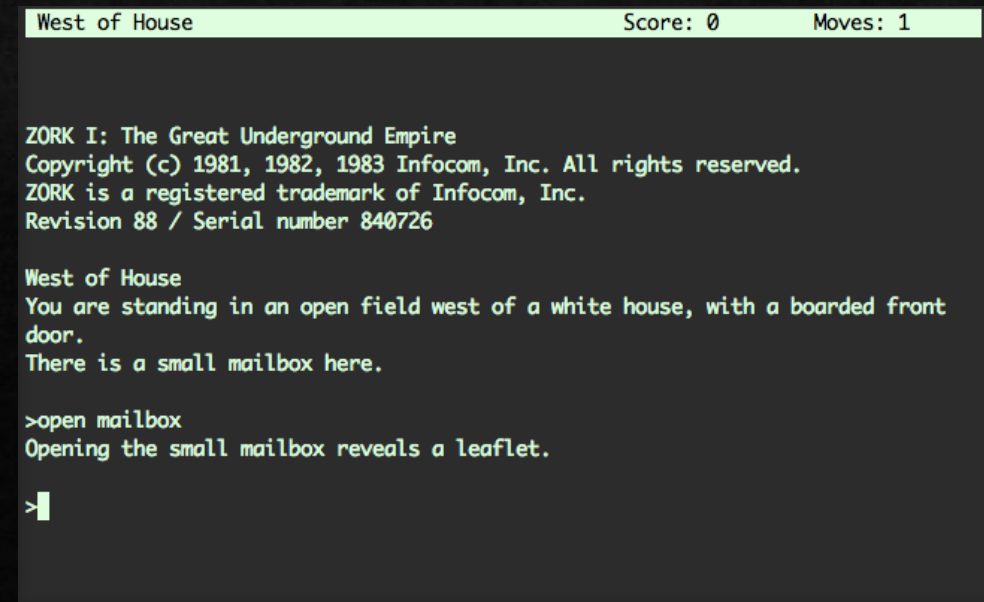
```
West of House                    Score: 0        Moves: 1

ZORK I: The Great Underground Empire
Copyright (c) 1981, 1982, 1983 Infocom, Inc. All rights reserved.
ZORK is a registered trademark of Infocom, Inc.
Revision 88 / Serial number 840726

West of House
You are standing in an open field west of a white house, with a boarded front
door.
There is a small mailbox here.

>open mailbox
Opening the small mailbox reveals a leaflet.

>
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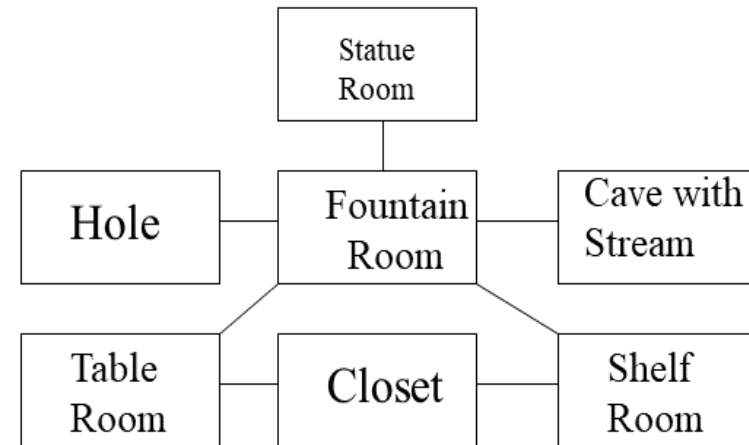
Puzzles and Sandboxes

- In IF, puzzles often serve as "gateways" to sandboxes.

- In "Lost Pig," solving the opening puzzle leads a sandbox of seven rooms.

- The player can visit these rooms freely and interact with objects in them, but the rooms also offer new puzzles.
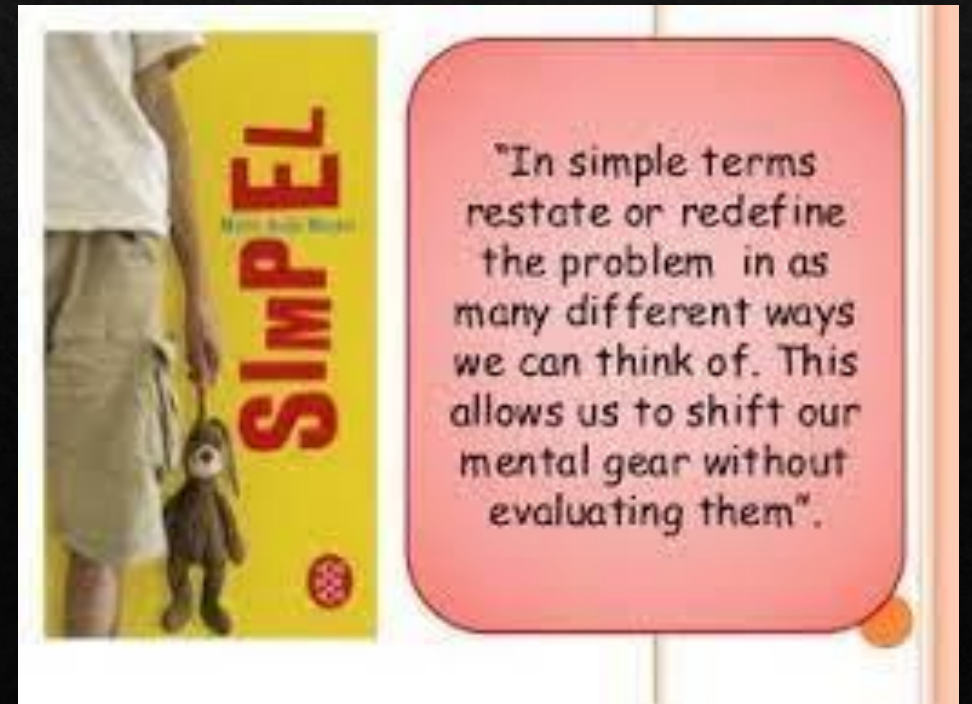
Map for *Lost Pig*

```
                    +-----------+
                    | Statue    |
                    | Room      |
                    +-----------+
                          |
+-----------+       +-----------+       +-----------+
| Hole      |-------| Fountain  |-------| Cave with |
|           |       | Room      |       | Stream    |
+-----------+       +-----------+       +-----------+
                    /           \
+-----------+       +-----------+       +-----------+
| Table     |-------| Closet    |-------| Shelf     |
| Room      |       |           |       | Room      |
+-----------+       +-----------+       +-----------+
```

Common Core Anchor Standards

◇ Read closely to determine what the text says explicitly and to make logical inferences from it.

◇ Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

Deriving a Thinking Skills Goal from a National Standard

◈ National Standard -- Solve problems by applying the mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. (English National Curriculum, Key Stage Three)

◈ Related Thinking Skills Goals
  ◇ Restating Problems
  ◇ Breaking Down Problems

"In simple terms restate or redefine the problem in as many different ways we can think of. This allows us to shift our mental gear without evaluating them".

Examples for Thinking Skills Transfer

◈ Common **Core** and English Education Goals

◇ Recognizing Problems in "Aotearoa" (Key Ideas and Details, Anchor Standards for Reading, U.S. Common Core)

◇ Restating Problems (Including Breaking Down Problems) in "Mrs. Pepper's Nasty Secret" or Wishbringer (English National Curriculum, Mathematics, Key Stage 3)

◇ Automating Information Processing, e.g. Mapping in "Robin and Orchid" (Standards for Mathematical Practice: Model with Mathematics, U.S. Common Core)

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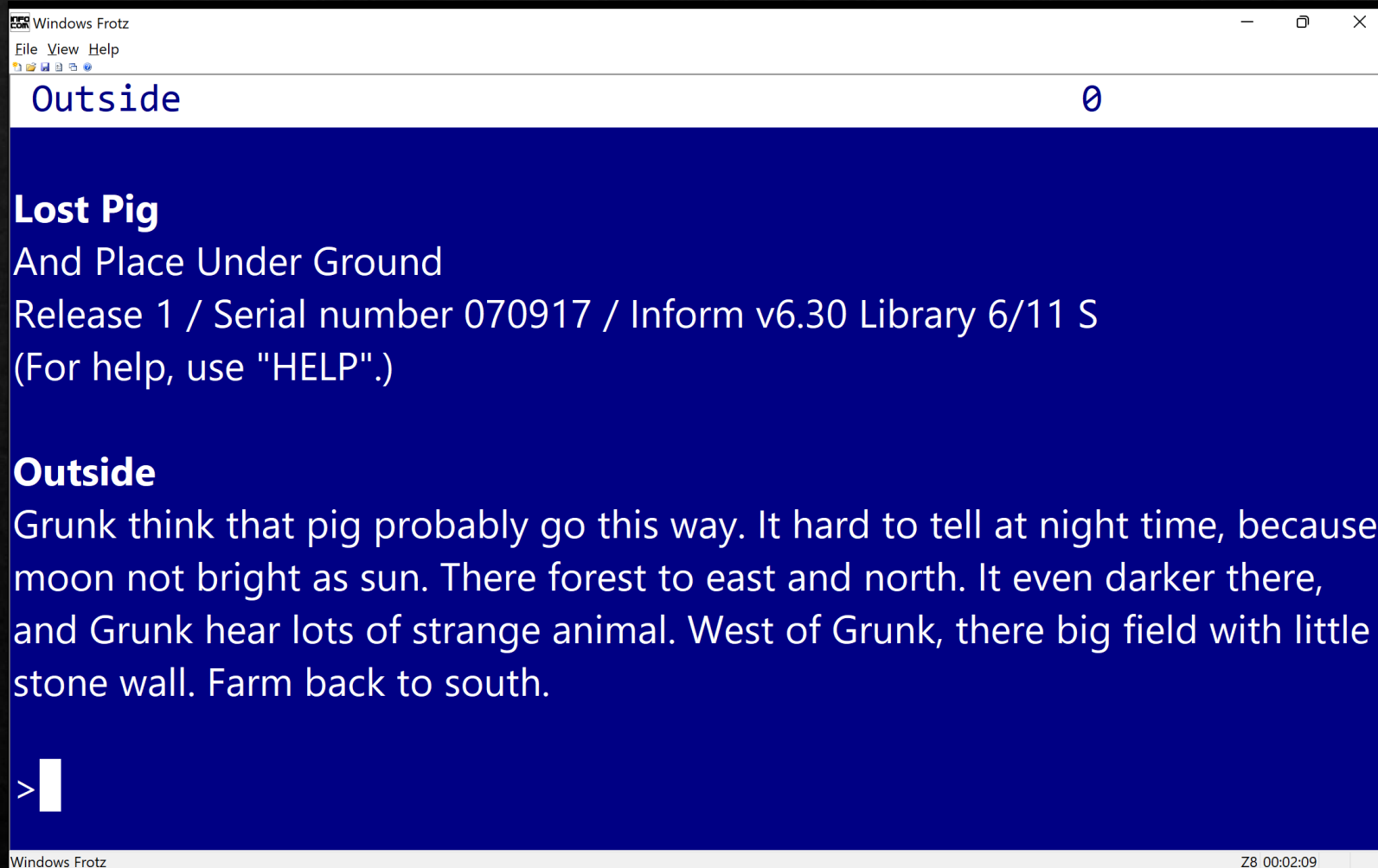
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Questions and Discussion: 10 (60)

Lost Pig Example


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Windows Frotz
File  View  Help

Outside                                            0

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And Place Under Ground
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>

Windows Frotz                                            Z8 00:02:09
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