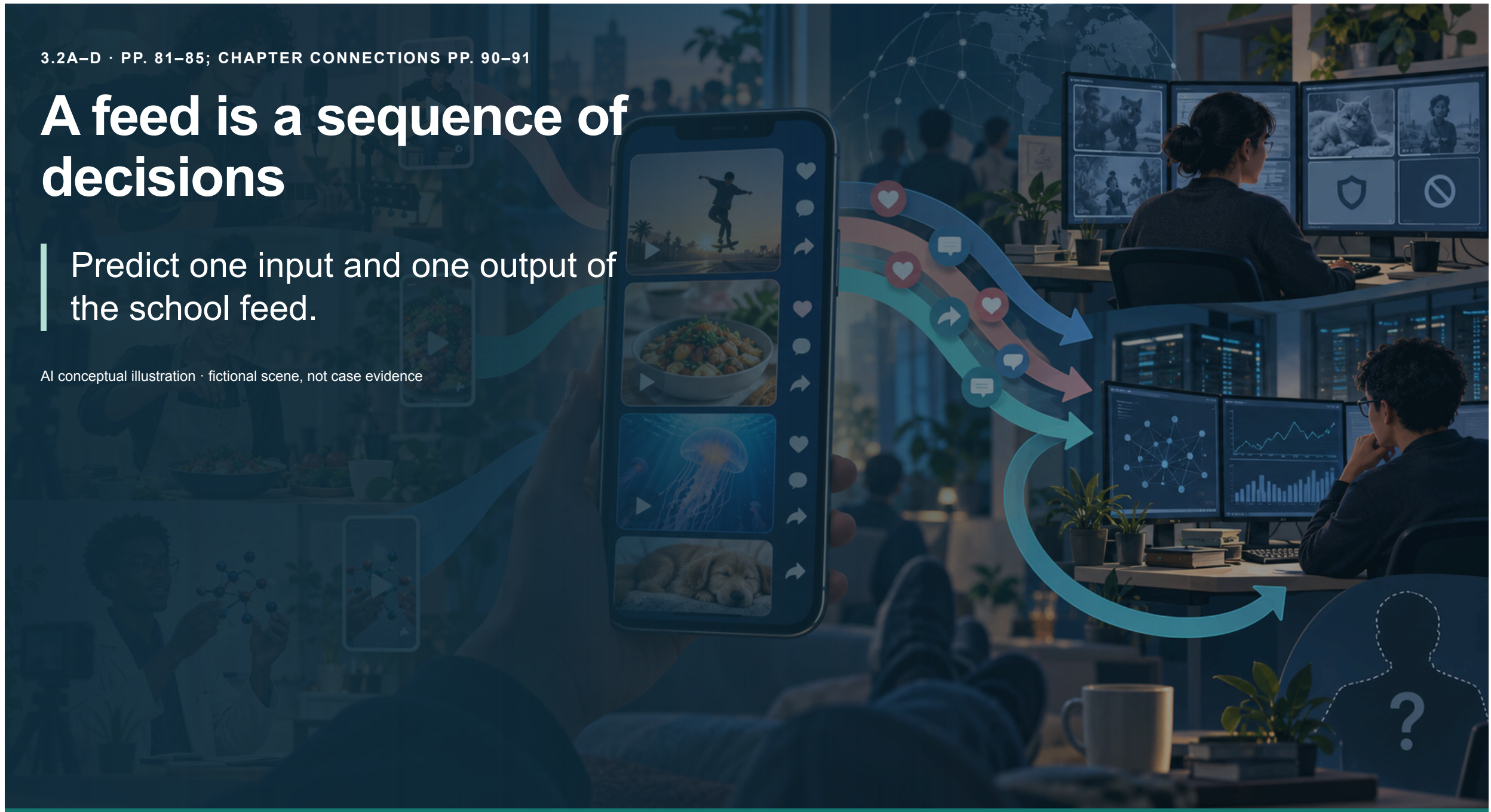


A feed is a sequence of decisions

Predict one input and one output of the school feed.

AI conceptual illustration · fictional scene, not case evidence



An algorithm

01

Input: B4, B1, B3, B2



02

Compare each record
with target B3



03

First match → return B3
and stop

A concrete procedure has defined information, a precise operation and a stopping condition.

A precise sequence of instructions for a task

Characteristics of a usable algorithm

AMBIGUOUS INSTRUCTION

Show the best item.

Unambiguous · finite · feasible · independent of a particular coding language

Unambiguous: each instruction has one clear meaning

FOLLOWABLE RULE

Sort by completion; break ties by item ID; stop at list end.

Seven characteristics make the procedure usable

Characteristic	Concrete test
Unambiguous / well defined	Exact comparison, order and error route
Finite / feasible	Stops; fits available resources
Inputs / outputs / independent	Zero or more inputs, specified output, same procedure across languages

The textbook lists seven characteristics. Independence means from a programming language, not from all inputs.

Defined input/output and language independence are part of the contract.

Variables hold values

Step	Instruction	total
Start	Set total to 0	0
Item A	Add 1	1
Item B	Add 1	2

A variable is a named place for a value

Conditionals choose a branch

duration = 60 seconds

TRUE → **include**

60 meets the boundary

Missing value → separate rule; missing ≠ 0

IF a test is true, follow one branch

duration ≤ 60?

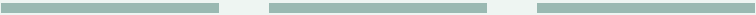
FALSE → **exclude**

75 fails the test

Loops repeat a set of instructions

WORKED TRACE · SYNTHETIC DURATIONS

30 s 75 s 60 s



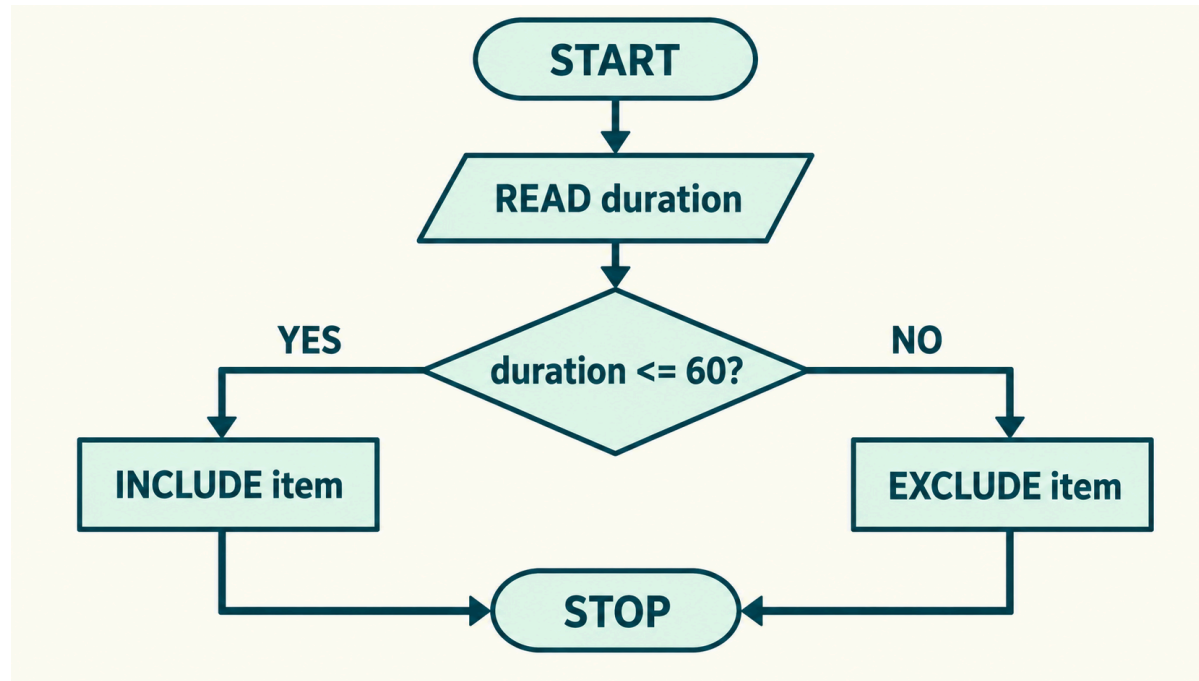
Start count = 0 · Test duration $\leq$ 60 · Advance even when false

30 → count 1; 75 → count 1; 60 → count 2; end → stop.

Watch the counter and current item. Explain why the second item does not add one.

FOR each item, apply the same test

One procedure, several representations



Original teaching diagram

Natural language explains a procedure in words

Algorithm, pseudocode and code

PROCEDURE

If a video is at most 60 seconds, say Include; otherwise say Exclude.

PSEUDOCODE

IF seconds $\leq$ 60
THEN say Include
ELSE say Exclude

PYTHON CODE

```
if seconds <= 60:  
    print("Include")  
else:  
    print("Exclude")
```

The code fragment assumes a numeric seconds value. The same decision is expressed in words, a planning notation and a specific language.

Algorithm: the underlying procedure

Searching finds a target

Comparison	Record	Match B3?
1	B4	No
2	B1	No
3	B3	Yes: stop

Linear search checks records one at a time

PageRank is part of a larger search system

CLASSROOM LINEAR SEARCH

Check IDs until target found or list ends

GOOGLE SEARCH SOURCE

Uses multiple ranking systems; link analysis includes evolved PageRank

Provider documentation explains the system broadly; current exact ranking weights are not public.

Link analysis differs from searching a list for an exact match.

Sorting changes the order

State	Values	Action
Start	3, 1, 2	Compare first pair
After swap	1, 3, 2	Compare next pair
After swap	1, 2, 3	End this pass

Sort arranges existing items by a stated key

Filtering and counting

Task	Output
Filter loans >= 10	A and C
Count matches	2 records
Sort all, descending loans	C, A, B

Filter: keep records that meet a condition

Efficiency needs a measure

RESOURCE MEASURE

3 comparisons

B3 in B4, B1, B3, B2

INPUT CONDITION

Sorted or unsorted?

State the assumptions

SOCIAL CRITERION

Fair access?

Speed alone cannot establish this

Name the measure before saying an algorithm is better.

Possible measures: comparisons, time or memory

Prioritizing turns a goal into an order

Item	Completion c	New topic m
M1	0.8	1
M2	0.9	0
M3	0.5	0

A ranking score combines chosen signals

A changed objective: prediction

SAME INPUTS

M1: $c=.8$, $m=1$

M2: $c=.9$, $m=0$

M3: $c=.5$, $m=0$

RULE A · DISCOVERY

$$c + 2m$$

The new-topic flag
contributes up to 2.

RULE B · COMPLETION

$$3c + .2m$$

Completion contributes
up to 3.

Predict first. Calculate all three scores. The next slide reveals the ranking.

Rule A: score = $c + 2m$

A changed objective: worked result

Synthetic score · teal: Rule A · rust: Rule B · common scale 0–2.8



Rule A ranks M1 first

Classifying and associating

CLASSIFICATION

Ticket → high / medium / low
urgency

A label assigns a category. Co-occurrence identifies a pattern, not a cause.

Classifying assigns records to a category

ASSOCIATION

Bread and soup → often in the
same basket

An association rule has a denominator

Synthetic basket	Bread?	Soup?
1	Yes	Yes
2	Yes	No
3	Yes	Yes

Among these three bread baskets, two contain soup: 2/3. This is not a causal experiment or population estimate.

Count co-occurrence before claiming a useful relationship.

Rules and learned models

SPECIFIED RULE

Designer chooses formula and weights

Human choices remain: training data, objective and evaluation.

A hand-written rule specifies the calculation

LEARNED MODEL

Examples fit internal parameters to a chosen objective

The complete decision pipeline

1. Collect/validate →

2. Filter eligible items →

3. Calculate score →

4. Rank and display

A response after display can become a later input. The rule and objective must be stated, not guessed.

Collect and validate the input

Independent transfer: a library queue

DEMAND

**More requests than
copies**

Fictional library

CHOOSE AN OBJECTIVE

**First request?
Need? Waiting
time?**

Defend the priority

TRACE THE RULE

**Input → condition →
stop → output**

Name who could lose priority

Independent transfer: close notes; produce four sentences with a trade-off.

A school library prioritizes reservation requests

Chapter 3.2: the knowledge to carry forward

PAUSE · INDIVIDUAL FIRST ATTEMPT · 2 MINUTES

Which explanation demonstrates a mechanism?

Predict / retrieve

Justify with an operation

Check → correct

Save your first response below. Explain the correction on a fresh example; practice is not a mark.

Describe characteristics and components