

teachingtools — Environments and tools for teaching materials *

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Released ?

1 Implementation

```
1 <*package>
2 <@@=teachingtools>
```

1.1 Preliminaries

The usual preliminaries apply.

```
3 \ProvidesExplPackage {teachingtools} {2017/11/25} {-1}
4 {Environments and tools for teaching materials}
```

This package depends on recent versions of the l3kernel. Versions from TeXLive 2016 or newer should be fine.

```
5 \@ifpackagelater { expl3 } { 2015/11/15 }
6 { }
7 {
8   \PackageError { teachingtools } { Support~package~expl3~too~old }
9   {
10     You~need~to~update~your~installation~of~the~bundles~'l3kernel'~and~
11     'l3packages'.\MessageBreak
12     Loading~teachingtools~will~abort!
13   }
14   \tex_endinput:D
15 }
```

Now load the support packages. chngcntr is required to modify counters while they're in use, and enumitem provides convenience macros for modifying lists.

```
16 \RequirePackage{ l3keys2e , chngcntr , enumitem }
```

1.2 Messages and error handling

All of the error and warning messages are defined here in one place to simplify things.

```
17 \msg_new:nnnn { teachingtools } { unknown-option }
18 { Unknown~option~'#1'. }
19 {
20   The~option~'#1'~is~not~known~by~teachingtools:~
```

*This file describes ?, last revised ?.

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```

21     perhaps~it~is~spelled~incorrectly.
22 }

```

`__teachingtools_error:nxx` Some general-purpose functions for throwing errors are defined next.

```

\__teachingtools_error:nx
\__teachingtools_error:n
\l__teachingtools_error_bool
23 \cs_new_protected:Npn \__teachingtools_error:nxx #1#2#3 {
24   \bool_set_true:N \l__teachingtools_error_bool
25   \msg_error:nxxx { teachingtools } {#1} {#2} {#3}
26 }
27 \cs_new_protected:Npn \__teachingtools_error:nx #1#2 {
28   \__teachingtools_error:nxx {#1} {#2} { }
29 }
30 \cs_new_protected:Npn \__teachingtools_error:n #1 {
31   \__teachingtools_error:nxx {#1} { } { }
32 }
33 \bool_new:N \l__teachingtools_error_bool

```

(End definition for __teachingtools_error:nxx and others.)

`\l__teachingtools_key_tl` Unknown options should raise an teachingtools-specific error message.

```

34 \tl_new:N \l__teachingtools_key_tl
35 \keys_define:nn { teachingtools } {
36   unknown .code:n = {
37     \msg_error:nxx { teachingtools } { unknown-option }
38     { \exp_not:V \l_keys_key_tl }
39   }
40 }
41 \AtBeginDocument {
42   \keys_define:nn { teachingtools } {
43     unknown .code:n = {
44       \msg_error:nxx { teachingtools } { unknown-option }
45       { \exp_not:V \l_keys_key_tl }
46     }
47   }
48 }

```

(End definition for \l__teachingtools_key_tl.)

1.3 Printing routines

Some general-purpose printing routines are provided here to ensure that text can be printed with the necessary configuration.

`__teachingtools_print_question:` This function prints the question environment numbering string.

```

49 \cs_new:Nn \__teachingtools_print_question: {
50   \tl_clear:N \l_tmpa_tl
51   \bool_if:NT \l__teachingtools_question_prefix_bool {
52     \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_question_prefix_tl }
53     \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_prefix_separator_str }
54   }
55   \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_question_label_tl }
56   \tl_to_str:N \l_tmpa_tl
57 }

```

(End definition for __teachingtools_print_question:.)

`_teachingtools_print_example:` This function prints the example environment numbering string.

```

58 \cs_new:Nn \_teachingtools_print_example: {
59   \tl_clear:N \l_tmpa_tl
60   \bool_if:NT \l__teachingtools_example_prefix_bool {
61     \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_example_prefix_tl }
62     \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_prefix_separator_str }
63   }
64   \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_example_label_tl }
65   \tl_to_str:N \l_tmpa_tl
66 }

```

(End definition for _teachingtools_print_example:.)

1.4 Resetting counters

`\l__teachingtools_reset_question_tl` The `reset-question` option provides a means for question numbering to be reset at different sectioning “levels”. The default is for numbering to be reset at the “section” level.

```

67 \newcounter{question}
68 \keys_define:nn { teachingtools } {
69   reset-question .default:n = section,
70   reset-question .choices:nn = {
71     part, chapter, section, subsection, subsubsection, paragraph, subparagraph
72   }
73   {
74     \counterwithin*{question}{ \tl_to_str:N \l_keys_choice_tl }
75   },
76   reset-question / none .code:n = {
77     \counterwithout*{question}{section}
78   },
79 }

```

(End definition for \l__teachingtools_reset_question_tl.)

`\l__teachingtools_reset_example_tl` The `reset-example` option provides a means for example numbering to be reset at different sectioning “levels”. The default is for numbering to be not reset.

```

80 \newcounter{example}
81 \keys_define:nn { teachingtools } {
82   reset-example .default:n = none,
83   reset-example .choices:nn = {
84     part, chapter, section, subsection, subsubsection, paragraph, subparagraph
85   }
86   {
87     \counterwithin*{example}{ \tl_to_str:N \l_keys_choice_tl }
88   },
89   reset-example / none .code:n = {
90     \counterwithout*{example}{section}
91   },
92 }

```

(End definition for \l__teachingtools_reset_example_tl.)

`\l__teachingtools_reset_all_tl` The `reset-all` option provides a means for environment numbering to be reset at different sectioning “levels”. The default is for numbering to be set individually for each environment.

```

93 \keys_define:nn { teachingtools } {
94   reset-all .choice:,
95   reset-all / part .meta:n = {
96     reset-question = part,
97     reset-example = part
98   },
99   reset-all / chapter .meta:n = {
100     reset-question = chapter,
101     reset-example = chapter
102   },
103   reset-all / section .meta:n = {
104     reset-question = section,
105     reset-example = section
106   },
107   reset-all / subsection .meta:n = {
108     reset-question = subsection,
109     reset-example = subsection
110   },
111   reset-all / subsubsection .meta:n = {
112     reset-question = subsubsection,
113     reset-example = subsubsection
114   },
115   reset-all / paragraph .meta:n = {
116     reset-question = paragraph,
117     reset-example = paragraph
118   },
119   reset-all / subparagraph .meta:n = {
120     reset-question = subparagraph,
121     reset-example = subparagraph
122   },
123   reset-all / none .meta:n = {
124     reset-question = none,
125     reset-example = none
126   },
127   reset-all / false .meta:n = {
128     reset-question,
129     reset-example
130   },
131   reset-all .default:n = false,
132   reset-all .initial:n = false,
133 }

```

(End definition for `\l__teachingtools_reset_all_tl`.)

1.5 Formatting counters and labels

The label style of both environments can be set to any of the predefined counter styles: arabic, alphabetic, uppercase alphabetic, Roman numerals, uppercase Roman numerals, and footnote symbols. The latter style is provided but not recommended for use.

The following features are planned but not yet implemented:

- **suffix**: The character to append after the counter
- formatting of environment? No idea how to do that

`\l_teachingtools_question_title_tl` The environment labels are built up as a token lists by appending or prefixing each
`\l__teachingtools_example_title_tl` element as necessary.

```
134 % \tl_new:N \l__teachingtools_question_title_tl
135 % \tl_new:N \l__teachingtools_example_title_tl
```

(End definition for `\l__teachingtools_question_title_tl` and `\l__teachingtools_example_title_tl`.)

Each environment can have an optional prefix to precede the number with that of the specified sectioning level. Note that this implies resetting of the environment counter at the specified level, unless overridden by the `reset-question`, `reset-example`, or `reset-all` options. The default is none.

`\l_teachingtools_prefix_separator_tl` The **prefix-separator** is a character used to separate the environment numbering prefix from its number, if the prefix exists.

```
136 \str_new:N \l__teachingtools_prefix_separator_str
137 \keys_define:nn { teachingtools } {
138   prefix-separator .choice:,
139   prefix-separator / dash .code:n = {
140     \str_set:Nn \l__teachingtools_prefix_separator_str { - }
141   },
142   prefix-separator / dot .code:n = {
143     \str_set:Nn \l__teachingtools_prefix_separator_str { . }
144   },
145   prefix-separator / colon .code:n = {
146     \str_set:Nn \l__teachingtools_prefix_separator_str { : }
147   },
148   prefix-separator / none .code:n = {
149     \str_gclear:N \l__teachingtools_prefix_separator_str
150   },
151   prefix-separator .default:n = none,
152   prefix-separator .initial:n = none,
153 }
```

(End definition for `\l__teachingtools_prefix_separator_tl`.)

`\l_teachingtools_question_prefix_tl` The **question-prefix** sets the prefix for the question environment.
`\l__teachingtools_question_prefix_bool`

```
154 \tl_new:N \l__teachingtools_question_prefix_tl
155 \bool_new:N \l__teachingtools_question_prefix_bool
156 \keys_define:nn { teachingtools } {
157   question-prefix .choice:,
158   question-prefix / part .code:n = {
159     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{part} }
160     \keys_set:nn { teachingtools } {
161       reset-question = part,
162       prefix-separator = dash,
163     }
164     \bool_set_true:N \l__teachingtools_question_prefix_bool
165   },
166   question-prefix / chapter .code:n = {
167     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{chapter} }
```

```

168 \keys_set:nn { teachingtools } {
169     reset-question = chapter,
170     prefix-separator = dash,
171 }
172 \bool_set_true:N \l__teachingtools_question_prefix_bool
173 },
174 question-prefix / section .code:n = {
175     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{section} }
176     \keys_set:nn { teachingtools } {
177         reset-question = section,
178         prefix-separator = dash,
179     }
180     \bool_set_true:N \l__teachingtools_question_prefix_bool
181 },
182 question-prefix / subsection .code:n = {
183     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{subsection} }
184     \keys_set:nn { teachingtools } {
185         reset-question = subsection,
186         prefix-separator = dash,
187     }
188     \bool_set_true:N \l__teachingtools_question_prefix_bool
189 },
190 question-prefix / subsubsection .code:n = {
191     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{subsubsection} }
192     \keys_set:nn { teachingtools } {
193         reset-question = subsubsection,
194         prefix-separator = dash,
195     }
196     \bool_set_true:N \l__teachingtools_question_prefix_bool
197 },
198 question-prefix / paragraph .code:n = {
199     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{paragraph} }
200     \keys_set:nn { teachingtools } {
201         reset-question = paragraph,
202         prefix-separator = dash,
203     }
204     \bool_set_true:N \l__teachingtools_question_prefix_bool
205 },
206 question-prefix / subparagraph .code:n = {
207     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{subparagraph} }
208     \keys_set:nn { teachingtools } {
209         reset-question = subparagraph,
210         prefix-separator = dash,
211     }
212     \bool_set_true:N \l__teachingtools_question_prefix_bool
213 },
214 question-prefix / none .code:n = {
215     \tl_gclear:N \l__teachingtools_question_prefix_tl
216 },
217 question-prefix .default:n = none,
218 question-prefix .initial:n = none,
219 }

```

(End definition for \l__teachingtools_question_prefix_tl and \l__teachingtools_question_prefix_bool.)

\l_teachingtools_example_prefix_tl
\l_teachingtools_example_prefix_bool

The example-prefix sets the prefix for the example environment.

```

220 \tl_new:N \l__teachingtools_example_prefix_tl
221 \bool_new:N \l__teachingtools_example_prefix_bool
222 \keys_define:nn { teachingtools } {
223   example-prefix .choice:,
224   example-prefix / part .code:n = {
225     \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{part} }
226     \bool_set_true:N \l__teachingtools_example_prefix_bool
227     \keys_set:nn { teachingtools } {
228       reset-example = part,
229       prefix-separator = dash,
230     }
231   },
232   example-prefix / chapter .code:n = {
233     \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{chapter} }
234     \bool_set_true:N \l__teachingtools_example_prefix_bool
235     \keys_set:nn { teachingtools } {
236       reset-example = chapter,
237       prefix-separator = dash,
238     }
239   },
240   example-prefix / section .code:n = {
241     \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{section} }
242     \bool_set_true:N \l__teachingtools_example_prefix_bool
243     \keys_set:nn { teachingtools } {
244       reset-example = section,
245       prefix-separator = dash,
246     }
247   },
248   example-prefix / subsection .code:n = {
249     \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{subsection} }
250     \bool_set_true:N \l__teachingtools_example_prefix_bool
251     \keys_set:nn { teachingtools } {
252       reset-example = subsection,
253       prefix-separator = dash,
254     }
255   },
256   example-prefix / subsubsection .code:n = {
257     \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{subsubsection} }
258     \bool_set_true:N \l__teachingtools_example_prefix_bool
259     \keys_set:nn { teachingtools } {
260       reset-example = subsubsection,
261       prefix-separator = dash,
262     }
263   },
264   example-prefix / paragraph .code:n = {
265     \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{paragraph} }
266     \bool_set_true:N \l__teachingtools_example_prefix_bool
267     \keys_set:nn { teachingtools } {
268       reset-example = paragraph,
269       prefix-separator = dash,
270     }
271   },
272   example-prefix / subparagraph .code:n = {

```

```

273 \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{subparagraph} }
274 \bool_set_true:N \l__teachingtools_example_prefix_bool
275 \keys_set:nn { teachingtools } {
276     reset-example = subparagraph,
277     prefix-separator = dash,
278 }
279 },
280 example-prefix / none .code:n = {
281     \tl_gclear:N \l__teachingtools_example_prefix_tl
282     \bool_set_false:N \l__teachingtools_example_prefix_bool
283 },
284 example-prefix .default:n = none,
285 example-prefix .initial:n = none,
286 }

```

(End definition for `\l__teachingtools_example_prefix_tl` and `\l__teachingtools_example_prefix_bool`.)

`\l__teachingtools_question_label_tl` The label on the question environment can be set using this key. The default is Arabic numerals, and the options `alph` and `roman` are aliases for `lower-alph` and `lower-roman`.

```

287 \tl_new:N \l__teachingtools_question_label_tl
288 \keys_define:nn { teachingtools } {
289     question-label .choice:,
290     question-label / arabic .code:n = {
291         \tl_set:Nn \l__teachingtools_question_label_tl { \arabic{question} }
292     },
293     question-label / alph .code:n = {
294         \tl_set:Nn \l__teachingtools_question_label_tl { \alph{question} }
295     },
296     question-label / lower-alph .code:n = {
297         \tl_set:Nn \l__teachingtools_question_label_tl { \alph{question} }
298     },
299     question-label / upper-alph .code:n = {
300         \tl_set:Nn \l__teachingtools_question_label_tl { \Alph{question} }
301     },
302     question-label / roman .code:n = {
303         \tl_set:Nn \l__teachingtools_question_label_tl { \roman{question} }
304     },
305     question-label / lower-roman .code:n = {
306         \tl_set:Nn \l__teachingtools_question_label_tl { \roman{question} }
307     },
308     question-label / upper-roman .code:n = {
309         \tl_set:Nn \l__teachingtools_question_label_tl { \Roman{question} }
310     },
311     question-label / footnote-symbol .code:n = {
312         \tl_set:Nn \l__teachingtools_question_label_tl { \fnsymbol{question} }
313     },
314     question-label .default:n = arabic,
315     question-label .initial:n = arabic,
316 }

```

(End definition for `\l__teachingtools_question_label_tl`.)

`\l__teachingtools_example_label_tl` The label on the example environment can be set using this key. The default is also Arabic numerals.


```

317 \tl_new:N \l__teachingtools_example_label_tl
318 \keys_define:nn { teachingtools } {
319   example-label .choice:,
320   example-label / arabic .code:n = {
321     \tl_set:Nn \l__teachingtools_example_label_tl { \arabic{example} }
322   },
323   example-label / alph .code:n = {
324     \tl_set:Nn \l__teachingtools_example_label_tl { \alph{example} }
325   },
326   example-label / lower-alph .code:n = {
327     \tl_set:Nn \l__teachingtools_example_label_tl { \alph{example} }
328   },
329   example-label / upper-alph .code:n = {
330     \tl_set:Nn \l__teachingtools_example_label_tl { \Alph{example} }
331   },
332   example-label / roman .code:n = {
333     \tl_set:Nn \l__teachingtools_example_label_tl { \roman{example} }
334   },
335   example-label / lower-roman .code:n = {
336     \tl_set:Nn \l__teachingtools_example_label_tl { \roman{example} }
337   },
338   example-label / upper-roman .code:n = {
339     \tl_set:Nn \l__teachingtools_example_label_tl { \Roman{example} }
340   },
341   example-label / footnote-symbol .code:n = {
342     \tl_set:Nn \l__teachingtools_example_label_tl { \fnsymbol{example} }
343   },
344   example-label .default:n = arabic,
345   example-label .initial:n = arabic,
346 }

```

(End definition for \l__teachingtools_example_label_tl.)

1.6 Dimensions and lengths

A number of dimensions and lengths are used internally to define spacing around each environment. Each environment has its own skip length, initially set to the value of that for the question environment.

```

347 \skip_new:N \questionbefore
348 \skip_new:N \questionafter
349 \skip_new:N \answerbefore
350 \skip_new:N \answerafter
351 \skip_new:N \examplebefore
352 \skip_new:N \exampleafter
353 \skip_new:N \noticebefore
354 \skip_new:N \noticeafter
355
356 \skip_set:Nn \questionbefore { 1.0ex plus -1ex minus -0.25ex }
357 \skip_set:Nn \questionafter { 1ex plus 0.25ex }
358
359 \skip_set_eq:NN \answerbefore \questionbefore
360 \skip_set_eq:NN \examplebefore \questionbefore
361 \skip_set_eq:NN \noticebefore \questionbefore
362

```

```

363 \skip_set_eq:NN \answerafter \questionafter
364 \skip_set_eq:NN \exampleafter \questionafter
365 \skip_set_eq:NN \noticeafter \questionafter

```

1.7 Environments

This package defines a number of environments for teaching materials.

question The `\question` environment is used to create a list of questions. The starred version is unnumbered and does not increment the question counter.

```

366 \NewDocumentEnvironment { question } { s } {
367   \par \skip_vertical:N \questionbefore
368   \IfBooleanTF #1
369     { { \bfseries Question.\par } }
370     {
371       \refstepcounter{question}
372       {\bfseries Question~\__teachingtools_print_question: .\par}
373     }
374   \begin{itshape}
375 }
376 {\end{itshape}\par \skip_vertical:N \questionafter}
377 \cs_new:cpn {question*} {\question*}
378 \cs_new_eq:cN {endquestion*} \endquestion

```

answer The `\answer` environment is used to format the answer.

```

379 \NewDocumentEnvironment { answer } { s } {
380   \par\vspace\answerbefore
381   \setcounter{equation}{0}
382   { { \bfseries Solution:\par } }
383 }
384 {\par\vspace\answerafter}
385 \cs_new:cpn {answer*} {\example*}
386 \cs_new_eq:cN {endanswer*} \endexample

```

example The `\example` environment is used to create a list of examples. The starred version is unnumbered and does not increment the example counter.

```

387 \NewDocumentEnvironment { example } { s } {
388   \par\vspace\examplebefore
389   \IfBooleanTF #1
390     { { \bfseries Example.\par } }
391     {
392       \refstepcounter{example}
393       {\bfseries Example~\__teachingtools_print_example: .\par}
394     }
395 }
396 {\par\vspace\exampleafter}
397 \cs_new:cpn {example*} {\example*}
398 \cs_new_eq:cN {endexample*} \endexample

```

1.8 Document macros

The user document macros are all collected together here for ease.

`\ttsetup` The set-up macro simply moves to the correct path and executes whatever has been passed.

```
399 \NewDocumentCommand \ttsetup { m } {  
400   \keys_set:nn { teachingtools } {#1}  
401 }
```

(End definition for \ttsetup. This function is documented on page ??.)

1.9 Loading configuration

Apply the settings given at load time.

```
402 \ProcessKeysOptions { teachingtools }  
403 \</package>
```

Change History

v0.1

General: First public testing release . . . 1

v0.2

General: Added support for
environment numbering prefixes . . . 1

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