

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 }

```

Some general-purpose functions for throwing errors are defined next.

```

\__teachingtools_error:nxx 23 \cs_new_protected:Npn \__teachingtools_error:nxx #1#2#3 {
\__teachingtools_error:nx 24 \bool_set_true:N \l__teachingtools_error_bool
\__teachingtools_error:n 25 \msg_error:nnxx { teachingtools } {#1} {#2} {#3}
\l__teachingtools_error_bool 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.)

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:nnx { 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:nnx { 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.

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_put_right:Nx \l_tmpa_tl { \l__teachingtools_suffix_character_str }
57   \tl_to_str:N \l_tmpa_tl
58 }

```

(End definition for __teachingtools_print_question:.)

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

```

59 \cs_new:Nn \_teachingtools_print_example: {
60   \tl_clear:N \l_tmpa_tl
61   \bool_if:NT \l__teachingtools_example_prefix_bool {
62     \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_example_prefix_tl }
63     \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_prefix_separator_str }
64   }
65   \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_example_label_tl }
66   \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_suffix_character_str }
67   \tl_to_str:N \l_tmpa_tl
68 }

```

(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.

```

69 \newcounter{question}
70 \keys_define:nn { teachingtools } {
71   reset-question .default:n = section,
72   reset-question .choices:nn = {
73     part, chapter, section, subsection, subsubsection, paragraph, subparagraph
74   }
75   {
76     \counterwithin*{question}{ \tl_to_str:N \l_keys_choice_tl }
77   },
78   reset-question / none .code:n = {
79     \counterwithout*{question}{section}
80   },
81 }

```

(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.

```

82 \newcounter{example}
83 \keys_define:nn { teachingtools } {
84   reset-example .default:n = none,
85   reset-example .choices:nn = {
86     part, chapter, section, subsection, subsubsection, paragraph, subparagraph
87   }
88   {
89     \counterwithin*{example}{ \tl_to_str:N \l_keys_choice_tl }
90   },
91   reset-example / none .code:n = {
92     \counterwithout*{example}{section}
93   },
94 }

```

(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.

```

95 \keys_define:nn { teachingtools } {
96   reset-all .choice:,
97   reset-all / part .meta:n = {
98     reset-question = part,
99     reset-example = part
100   },
101   reset-all / chapter .meta:n = {
102     reset-question = chapter,
103     reset-example = chapter
104   },
105   reset-all / section .meta:n = {
106     reset-question = section,
107     reset-example = section
108   },
109   reset-all / subsection .meta:n = {
110     reset-question = subsection,
111     reset-example = subsection
112   },
113   reset-all / subsubsection .meta:n = {
114     reset-question = subsubsection,
115     reset-example = subsubsection
116   },
117   reset-all / paragraph .meta:n = {
118     reset-question = paragraph,
119     reset-example = paragraph
120   },
121   reset-all / subparagraph .meta:n = {
122     reset-question = subparagraph,
123     reset-example = subparagraph
124   },
125   reset-all / none .meta:n = {
126     reset-question = none,
127     reset-example = none
128   },
129   reset-all / false .meta:n = {
130     reset-question,
131     reset-example
132   },
133   reset-all .default:n = false,
134   reset-all .initial:n = false,
135 }

```

(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

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:Nx \l__teachingtools_prefix_separator_str { \c_colon_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 uppercase Latin characters; note that this presently implies a limit of 26 examples unless changed to a different label style.

```

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 { \lowercase{\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 { \lowercase{\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 = upper-alph,
345 example-label .initial:n = upper-alph,
346 }

```

(End definition for \l__teachingtools_example_label_tl.)

\l__teachingtools_suffix_character_str The suffix-character is a character appended after the environment number.

```

347 \str_new:N \l__teachingtools_suffix_character_str
348 \keys_define:nn { teachingtools } {
349   suffix-character .choice:,
350   suffix-character / dot .code:n = {
351     \str_set:Nn \l__teachingtools_suffix_character_str { . }
352   },
353   suffix-character / colon .code:n = {
354     \str_set:Nx \l__teachingtools_suffix_character_str { \c_colon_str }
355   },
356   suffix-character / bracket .code:n = {
357     \str_set:Nx \l__teachingtools_suffix_character_str { ) }
358   },
359   suffix-character / none .code:n = {
360     \str_gclear:N \l__teachingtools_suffix_character_str
361   },
362   suffix-character .default:n = dot,
363   suffix-character .initial:n = dot,
364 }

```

(End definition for \l__teachingtools_suffix_character_str.)

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.

```

365 \skip_new:N \questionbefore
366 \skip_new:N \questionafter
367 \skip_new:N \answerbefore
368 \skip_new:N \answerafter
369 \skip_new:N \examplebefore
370 \skip_new:N \exampleafter
371 \skip_new:N \noticebefore
372 \skip_new:N \noticeafter
373
374 \skip_set:Nn \questionbefore { 1.0ex plus -1ex minus -0.25ex }
375 \skip_set:Nn \questionafter { 1ex plus 0.25ex }
376
377 \skip_set_eq:NN \answerbefore \questionbefore
378 \skip_set_eq:NN \examplebefore \questionbefore
379 \skip_set_eq:NN \noticebefore \questionbefore
380
381 \skip_set_eq:NN \answerafter \questionafter
382 \skip_set_eq:NN \exampleafter \questionafter
383 \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.

```

384 \NewDocumentEnvironment { question } { s } {
385   \par \skip_vertical:N \questionbefore
386   \IfBooleanTF #1
387     { { \bfseries Question.\par\nopagebreak } }
388     {
389       \refstepcounter{question}
390       {\bfseries Question~\__teachingtools_print_question: \par\nopagebreak}
391     }
392   \begin{itshape}
393 }
394 {\end{itshape}\par \skip_vertical:N \questionafter}
395 \cs_new:cpn {question*} {\question*}
396 \cs_new_eq:cN {endquestion*} \endquestion

```

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

```

397 \NewDocumentEnvironment { answer } { s } {
398   \par\vspace\answerbefore
399   \setcounter{equation}{0}
400   { \bfseries Solution:\par\nopagebreak }
401 }
402 {\par\vspace\answerafter}
403 \cs_new:cpn {answer*} {\example*}
404 \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.

```

405 \NewDocumentEnvironment { example } { s } {
406   \par\vspace\examplebefore
407   \IfBooleanTF #1
408     { { \bfseries Example.\par\nopagebreak } }
409     {
410       \refstepcounter{example}
411       {\bfseries Example~\__teachingtools_print_example: \par\nopagebreak}
412     }
413 }
414 {\par\vspace\exampleafter}
415 \cs_new:cpn {example*} {\example*}
416 \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.

```

417 \NewDocumentCommand \ttsetup { m } {
418   \keys_set:nn { teachingtools } {#1}
419 }

```

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

1.9 Loading configuration

Apply the settings given at load time.

```

420 \ProcessKeysOptions { teachingtools }
421 \</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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