

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:nxxx { 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.

```

\l__teachingtools_key_tl 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.

This function prints the question environment numbering string.

```

\__teachingtools_print_question: 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

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.

```

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

```

(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
152 \tl_new:N \l__teachingtools_question_prefix_tl
153 \bool_new:N \l__teachingtools_question_prefix_bool
154 \keys_define:nn { teachingtools } {
155   question-prefix .choice:,
156   question-prefix / part .code:n = {
157     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{part} }
158     \keys_set:nn { teachingtools } {
159       reset-question = part,
160       prefix-separator = dash,
161     }
162     \bool_set_true:N \l__teachingtools_question_prefix_bool
163   },
164   question-prefix / chapter .code:n = {
165     \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{chapter} }
166     \keys_set:nn { teachingtools } {
167       reset-question = chapter,
168       prefix-separator = dash,
169     }
170     \bool_set_true:N \l__teachingtools_question_prefix_bool
171   },
172   question-prefix / section .code:n = {

```

```

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

```

(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.

```

218 \tl_new:N \l__teachingtools_example_prefix_tl
219 \bool_new:N \l__teachingtools_example_prefix_bool
220 \keys_define:nn { teachingtools } {
221     example-prefix .choice:,

```

```

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

```

```

276     }
277   },
278   example-prefix / none .code:n = {
279     \tl_gclear:N \l__teachingtools_example_prefix_tl
280     \bool_set_false:N \l__teachingtools_example_prefix_bool
281   },
282   example-prefix .default:n = none,
283   example-prefix .initial:n = none,
284 }

```

(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`.

```

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

```

(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.

```

315 \tl_new:N \l__teachingtools_example_label_tl
316 \keys_define:nn { teachingtools } {
317   example-label .choice:,
318   example-label / arabic .code:n = {

```



```

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

```

(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.

```

345 \skip_new:N \questionbefore
346 \skip_new:N \questionafter
347 \skip_new:N \answerbefore
348 \skip_new:N \answerafter
349 \skip_new:N \examplebefore
350 \skip_new:N \exampleafter
351 \skip_new:N \noticebefore
352 \skip_new:N \noticeafter
353
354 \skip_set:Nn \questionbefore { 1.0ex plus -1ex minus -0.25ex }
355 \skip_set:Nn \questionafter { 1ex plus 0.25ex }
356
357 \skip_set_eq:NN \answerbefore \questionbefore
358 \skip_set_eq:NN \examplebefore \questionbefore
359 \skip_set_eq:NN \noticebefore \questionbefore
360
361 \skip_set_eq:NN \answerafter \questionafter
362 \skip_set_eq:NN \exampleafter \questionafter
363 \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.

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

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

```
377 \NewDocumentEnvironment { answer } { s } {  
378   \par\vspace\answerbefore  
379   \setcounter{equation}{0}  
380   { \bfseries Solution:\par }  
381 }  
382 {\par\vspace\answerafter}  
383 \cs_new:cpn {answer*} {\example*}  
384 \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.

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

1.8 Document macros

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

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

```
397 \NewDocumentCommand \ttsetup { m } {  
398   \keys_set:nm { teachingtools } {#1}  
399 }
```

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

1.9 Loading configuration

Apply the settings given at load time.

```
400 \ProcessKeysOptions { teachingtools }
401 \</package>
```

Change History

v0.1	v0.2
General: First public testing release . . 1	General: Added support for environment numbering prefixes . . 1

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