The *Elemente der Naturwissenschaft (Elemente)* is a journal which has been published in two issues per year for over 50 years, containing articles from the entire range of natural science disciplines based on Goetheanistic or holistic approaches. The journal is published by the Natural Science Section at the Goetheanum. It does not have any commercial aims but must get funded from the proceeds of subscriptions. However, it is our wish to offer educational institutions very fair access options!

1 Access options for schools:

1.1 School subscription

Schools have the opportunity of taking out a school subscription for the price of a private individual subscription. Like the private individual subscription, the school subscription includes delivery of the published printed issues but, in contrast to the private individual subscription, allows their use throughout the school. In addition to the printed journal there is unlimited online access to all purchased issues (those which came with your subscription) and annually a free download of twenty articles from non-purchased issues. The online access can be shared with the members of the teaching staff but not with students or external parties. However, articles downloaded by teachers may be distributed to students. Distribution outside the school is not permitted.

At a glance: annually:	EUR
\checkmark Purchase of new issues of the printed journal	30
\checkmark Purchase of new issues of the online journal	free
PPV credit balance to the value of the printed journal subscription	_
Period of ownership of PPV download extended to one calendar year	_
Permanent acquisition of any PPV article that has been paid six times	_
Unrestricted access via PPV to all years not purchased	_
Total annual cost for your access to the <i>Elemente</i>	30

2 Access options for libraries and public institutions:

2.1 Print subscription

With this option your institution or library may subscribe to the printed *Elemente* journal for the price of a private individual subscription and is permitted to make the journal publicly available. Unrestricted online access within your network is included for all purchased issues of the journal.

At a glance: annually:	EUR
\checkmark Purchase of new issues of the printed journal	30
\checkmark Purchase of new issues of the online journal	free
PPV credit balance to the value of the printed journal subscription	_
Period of ownership of PPV download extended to one calendar year	_
Permanent acquisition of any PPV article that has been paid six times	_
Unrestricted access via PPV to all years not purchased	_
Total annual cost for your access to the <i>Elemente</i>	30

2.2 Modified Pay-Per-View Model

As an alternative we also offer a modified Pay-Per-View (PPV) access which you can choose to make available to a restricted user group by means of an access code or to all users in your network. When an article is downloaded, the relevant PPV fees become payable and will be invoiced to your institution at the end of the calendar year.

Our PPV model differs from the classical PPV model in three key areas:

- The period of ownership, i.e. the period during which the same article can be downloaded in your network without further PPV fees, is not the standard 24 hours but the current calendar year! *Within the current year you therefore pay the PPV fee once at most for each article*, even if the article is accessed by different people several times (e.g. for a seminar).
- After reaching the maximum yearly invoice price of 108 EUR all further downloads of any articles in the Elemente are free to your institution! This equals 18 articles (at EUR 6 per article) which you have to pay for, even though for example, 57 different articles were downloaded multiple

times during the year. However, in the case of systematic mass downloads we reserve the right to temporarily restrict your access (like other journals).

• If an article is repeatedly downloaded in more than six years, then it counts as having been permanently purchased, as in a subscription model. There are therefore no more PPV fees due for any downloads of this article in subsequent years. Over the years you therefore only pay for an article a maximum of six times.

The benefits of this modified PPV model consist of unlimited access to all issues without any fixed costs: you pay upon download only; there is no risk of paying for an article twice in the same year and there is automatic acquisition of articles downloaded frequently; there is no prepaid credit balance (token) but there is a cost cap which does not put any kind of restriction on access! This on-demand model is therefore an ideal solution from a financial point of view if your institution's annual use of the *Elemente* is quite variable or very low.

At a glance: annually:	EUR
Purchase of new issues of the printed journal	
Purchase of new issues of the online journal	_
PPV credit balance to the value of the printed journal subscription	_
\checkmark Period of ownership of PPV download extended to one calendar year	free
✓ Permanent acquisition of any PPV article that has been paid six times	free
\checkmark Unrestricted access via PPV to all years not purchased*	0-108
Total annual cost for your access to the <i>Elemente</i> *	0-108

* Depending on the frequency of PPV access to all issues of the *Elemente*.

2.3 Printed journal subscription with modified Pay-Per-View access to issues not subscribed to

With this access option your institution or library may subscribe to the printed *Elemente* journal for the price of a private single individual subscription and is permitted to make the journal publicly available. Unrestricted online access within your network is included for all *purchased issues* of the journal.

PPV access is available for *issues not subscribed to* under the conditions described above in the PPV model, but with the following additional benefits:

- Your institution will also be allocated the subscription price of the printed version as a PPV credit balance. This means that: *if only a few articles are downloaded from non-purchased issues whose PPV fees total less than the annual subscription price, then your institution will not incur any extra costs.* The extended period of ownership of one calendar year also applies, i.e. your credit balance will not be reduced by repeated downloads of the same article.
- When the credit balance is used up, then the relevant PPV fees apply to every further download of an article not previously viewed, however only until the maximum PPV invoice total of EUR 78 has been reached. All further downloads of non-purchased issues are free. (So you pay for a maximum of 13 different articles from non-purchased issues.)

The PPV fees add up to the annual subscription costs of the printed journal, with your institution not paying more than EUR 108 per year in total.

This option combines the benefits of the subscription model with the benefits of the PPV model, without you being subject to the disadvantages of the traditional subscription or PPV models.

At a glance: annually:	EUR
\checkmark Purchase of new issues of the printed journal	30
\checkmark Purchase of new issues of the online journal	free
\checkmark PPV credit balance to the value of the printed journal subscription	free
\checkmark Period of ownership of PPV download extended to one calendar year	free
\checkmark Permanent acquisition of any PPV article that has been paid six times	free
\checkmark Unrestricted access via PPV to all years not purchased*	0-78
Total annual cost for your access to the <i>Elemente</i> *	30-108

* Depending on the frequency of PPV access to all issues of the *Elemente* not purchased, after the annual PPV credit balance has been used up.

2.4 Which of the two dynamic access models is more cost effective?

Apart from the basic decision of a subscription-based access model or a PPVbased one, simple demand models can be used to demonstrate which of the two dynamic options with unlimited access presented here – the modified PPV access option or the subscription PPV combination option – is more costeffective for a particular library. At first glance it may appear that the better choice is the modified PPV model, as it has no annual subscription fees, i.e. minimum invoiced amounts for information or issues of the *Elemente* which may not even be used (and both access models have an upper limit of the same maximum invoiced amount). A closer look shows that the subscription model is more cost-effective after only a few annual downloads.

The simple model of annual download activity enables an evaluation of the theoretical average costs for the two dynamic access options. These must be viewed only as trends. Large statistical variations which are not visible from the average cost trend must be anticipated, especially for low download numbers (Figs. 1 and 2).

The cost trends show that the subscription model (with PPV access to the non-purchased articles) becomes increasingly cost-effective over the years, compared to the simple PPV access, *if annual use exceeds five different downloads*. This is due (independently of the demand modelling) to two reasons: first, the two dynamic access models are designed in such a way that they generate the same costs in the first year of implementation (if more than five different articles are downloaded). Second, the PPV downloads in the subscription model always fall in comparison to the PPV downloads in the pure PPV access model due to the constant acquisition of newly published issues or articles from the *Elemente*, which are not subject to any PPV fees if they are downloaded from the *Elemente* website within the network of the subscribing institution.

In detail: how are the download numbers calculated?

Model of proportional usage

With the very simplified assumption that the average annual number n of the journal articles requested in a library is first proportional to the total number of articles $N_{\rm A}$ in this journal and second to the total number of users $N_{\rm U}$ of the library, the equation

$$n = w N_{\rm U} N_{\rm A}$$

gives a very simple model of journal usage. The proportionality factor w in the model corresponds to the mean relevance coefficient of an average article in this journal for an average library user (and is naturally highly dependent on the actual journal. It has to be empirically determined for each user group).

Figure 1: Modelled annual downloads for a low relevance of the *Elemente* articles and/or low number of library users (left axis). The resulting annual costs can be seen as cost trends of the two access options (right axis). This is based on a relevance half-life of $T_2 = 10$ years and constant library usage, giving 5 annual downloads (without multiple downloads of the same article). In this situation both access options are causing identical costs.

Figure 2: Modelled annual downloads for a medium relevance of the *Elemente* articles and/or a higher number of library users (left axis). The resulting annual costs can be seen as cost trends of the two access options (right axis). This was based on a relevance half-life of $T_2 = 10$ years and constant library usage, giving 11 annual downloads (without multiple downloads of the same article). In this situation the combined subscription and PPV access is causing lower costs than the pure PPV access.



Usage model with a better modelling of relevance

The proportional usage model does not take account of the fact that older articles are generally of lower relevance for the reader. The model can be improved if the relevance is taken as an exponentially declining function with a specific half-life.

Proportionality with specific relevance to the year w_i is then only assumed for the downloaded articles of one year n_i to the stock of articles N_i of this year *i*:

$$n_i = w_i N_{\rm U} N_i.$$

Using the exponential relevance approach w_i , the total number $n_{1,j}$ of the downloaded articles of all years is described through summation by

$$n_{1,j} = N_{\rm U} w_0 \sum_{i=1}^{j} e^{-\frac{\ln(2)}{T_2}j - i} N_i$$

where T_2 is the half-life of the relevance in years, j the current journal year and w_0 the mean relevance of an article which has just been published.

For a subscription to the print version from year k, only the proportion of downloads $n_{1,k}$ is relevant for the PPV access, which comes from the non-purchased journal years 1 to k and is given by

$$n_{1,k} = N_{\rm U} w_0 \sum_{i=1}^k e^{-\frac{\ln(2)}{T_2}j - i} N_i.$$

To take account of changing user groups or library usage, $N_{\rm U}$ was substituted by an exponential approach so that the annual downloads $n_{1,j}$ (and correspondingly also $n_{1,k}$) can be specified by

$$n_{1,j} = N_{U_k} e^{\frac{\ln(2)}{t_2}j - k} w_0 \sum_{i=1}^j e^{-\frac{\ln(2)}{T_2}j - i} N_i$$

where N_{U_k} is the user number in year k and t_2 the estimated doubling or half-life of users or library usage (in years).

2.5 Individual access options

We have intentionally refrained from making the access options dependent on the size of the subscribing institution and its number of users, and we can even offer very small libraries good conditions with these access options. However, we intend to have an evaluation phase in which both the *Elemente der Naturwissenschaft*, and the subscribing institution can evaluate the access conditions and can adapt these if needed by mutual agreement. Besides the access conditions described here, alternative options can be negotiated in individual cases.

3 Access options for digital and virtual libraries:

3.1 Modified Pay-Per-View Model

Virtual libraries and online portals can use the modified PPV access under similar conditions to conventional libraries and public institutions, but usually without the extended ownership period for an article downloaded once and without permanent acquisition of the article after six PPV fee payments. The demand in your institution will be ascertained after a three year evaluation phase. During this period we must reserve the right to adjust the maximum amount (i.e. the cost cap) if necessary, if the number of downloads of different articles per year is in the three-figure range. Individual access options may also be appropriate in this case. Please contact us for further information.

At a glance: annually:	EUR
Purchase of new issues of the printed journal	_
Purchase of new issues of the online journal	_
PPV credit balance to the value of the printed journal subscription	-
Period of ownership of PPV download extended to one calendar year	-
Permanent acquisition of any PPV article that has been paid six times	-
\checkmark Unrestricted access via PPV to all years not purchased*	0-108*
Total annual cost for your access to the <i>Elemente</i>	0-108*

 \ast The maximum amount will be determined in an evaluation phase, depending on the frequency of PPV access.

4 Open Access Options in all access models

4.1 Open access articles in the Elemente

The journal has different categories of which four categories consist of smaller articles which have the character of commentaries or reviews. These are beside comments and obituaries especially discussions of newly published books and contributions to the 'Recent research reviewed' category which aim to acknowledge new scientific results and developments and to place these in a wider context. There is open access to this material as soon as it is published. It can be downloaded from the journal's website free of charge. Articles in the two other categories are not openly accessible immediately after publication, but can become so via *incremental open access* over time (see 4.3).

4.2 Authors' self-archiving

The *Elemente* allows authors to self-archive their articles both as pre-print and post-print, irrespective of the category in which they have been published. We thus support what is known as the 'green route' to open access.

4.3 Incremental open access

Due to its publication as a printed journal, the *Elemente der Naturwis*senschaft is financed from subscriptions. Since there are no commercial interests linked to the journal, we regard all the proceeds generated by a particular article as *incremental contributions towards an open access amount* which covers our expenses. If the proceeds reach this amount, then the article in question will be made generally openly accessible and can be downloaded by anyone from our website free of charge. For the access model described above, this means that every PPV fee contributes to this open access amount. The subscription proceeds are credited proportionally to the articles contained in the published issues. As the open access in this model is reached step by step from the proceeds of subscriptions and PPV income, there is no chance of 'double dipping'.

Therefore in addition to the cost cap in the access options for libraries described above (which is naturally limited to the libraries in question) we also provide a global cost cap, so we can guarantee that an article will never generate higher costs for the scientific community over the years than an article from a purely open access journal with an 'article processing charge' of the same amount.

While the time delay involved in these articles becoming openly accessible can be seen as a disadvantage of this *incremental open access* model, the redistribution of the fee from the authors or the funding research institution to many readers, libraries and institutions who share the fee – similar to financing through crowd funding – can be seen as an advantage (and it also fulfils the causation principle).

In detail: financing incremental open access:

Article costs

The amount required to reach open access for an article is based on our actual costs and is currently 1,400 euros. In our case, a little bit more than the half of this figure are due solely to production costs (printing and typesetting) and shipping costs. The remainder part is comprised of the costs for editing work, proofreading, the costs for the online medium and administration.

Proceeds per article

The current proceeds from journal subscriptions by public institutions and private individuals cover a half of this amount at the time when the article is published (i.e. the abovementioned subscription prices are exclusively production and distribution costs for the two issues published annually). Approximately another quarter of the amount is financed through institutional contributions and grants. The remainder is covered incrementally by article downloads, i.e. PPV income.



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