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3 **Using an e-book platform as a learning resource and information management tool:**
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5 **The case study of the 'K' e-book platform at an English Business School.**
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13 **Abstract:**
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16 Information technology provides students with new ways of learning and their teachers with
17 new insights into how they learn. A new education industry has developed around a basic
18 premise that learning analytics data is a useful guide to the learning experience and its
19 outcomes of students. Quite apart from the philosophical issues associated with the
20 interpretation of subjective experience, there are also significant challenges associated with
21 what is used to measure learning behaviours and what value we place on these measurements.
22 This paper presents a case study of an e-textbooks platform was introduced by an English
23 Business School to support students enrolled onto undergraduate business degrees in Asia.
24 The findings are conceptualised within Self-Regulated Learning theory, and suggest that
25 there are clear benefits to be derived from the application of such a platform both for the
26 student and the institution. However, there are also challenges associated with the
27 introduction of new technology, not least antipathy towards the use of new technology from
28 teachers and students. In short, such a project requires not only a philosophical commitment
29 to new approaches in empowering student learning, but also the effective management of the
30 initiative itself by those who wish to introduce new forms of technology.
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52 **Keywords:** e-textbooks; learning analytics; Self-Regulated Learning; online/distance
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Introduction:

This paper has two main research foci. The first research focus relates to the potential benefits for students of adopting an e-textbook platform as a learning resource. As Higher Education explores how best to improve the quality of the curriculum, and promote the concept of life-long learning, institutions are looking at ideas that draw from andragogy and heutagogy. The second research focus explores the potential benefits to be derived from the interpretation of learning analytics. For Clow (2013, 2), 'learning analytics... is a new lens through which teachers can understand education'. The data derived from learning analytics enables 'actionable intelligence' (Campbell, DeBlois and Oblinger, 2007) which can lead to improvements in the delivery of study programmes and enhance student satisfaction. There are a range of possibilities that exist for university teachers to track how students, both individually and collectively, engage with their virtual learning environment (VLE). In specific terms, this paper posits three research questions: How may teachers apply learning analytics as a management tool to support students more effectively? How may learning analytics provide a better insight into student interaction with their learning resources?

Literature review:***Improving the quality of learning- a research-rich approach based on student empowerment and ownership of learning:***

In November 2016, a decision was taken at a leading Business School in the North East of England to promote research-rich learning in its international distance learning undergraduate degree programmes. These degrees were delivered through partnerships with local private academic support centres (ASCs) in Asia, who provided rudimentary support for students and

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3 served as a point of reference for both student and the awarding English university. Hitherto,
4 learning had been characterised by the transmission of information through pod-casts and
5 PowerPoint, with the ASCs supporting students via the provision of study skills and pastoral
6 support. In addition, paper textbooks were air freighted into Asia at great expense and with
7 little insight as to their usage and utility.
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14 Instead of providing students with content-heavy PowerPoint presentations and pod-casts,
15 this didactic methodology was replaced by one that accentuated collaborative forms of
16 learning through learning circles, wikis and discussion boards, as well as the use of personal
17 blogs. This shift in approach from teaching to learning was aimed at encouraging students to
18 take ownership of their studying but also necessitated a new approach in how resources were
19 conceived and used. This approach drew from the work on self-direction as enunciated in
20 andragogy (Knowles, 1989) and self-regulated learning (Zimmerman, 1989; 1998; Schunk
21 and Zimmerman, 1994; Pintrich, 2004; Boekaerts, 1999).
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32 The implications of adopting an andragogic approach are significant. Although andragogy
33 infers that the student is able to exercise some control over their learning, it presumes that
34 students possess the maturity and insight to act responsibly in exercising control over their
35 learning. In drawing from andragogy, the principle that we wanted to empower our
36 students, many of whom were experienced professionals with some years' of work
37 experience, was established. We also wished to focus on the idea of learning as a process as
38 well as the acquisition of knowledge. In this respect, the work of Self-Regulated Learning
39 (SRL) appeared to offer a conceptual insight into the process of learning. The underpinning
40 rationale to this approach was drawn from the research undertaken into SRL (Zimmerman,
41 1989; 1998; Schunk and Zimmerman, 1994; Schunk and Ertmer, 2000; Schunk, 2005;
42 Pintrich, 2004; Boekaerts, 1999; Boekaerts and Cascallar, 2006). Self-Regulated Learning
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theory places the learner at the centre of the learning process, not the teacher as in didactic teaching. According to Schunk (2005) SRL is:

An active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment.

SRL theory is concerned with how learners approach the management of their learning through goal-setting, regulation of commitment and meta-cognition. For Zimmerman (1989), SRL is defined in terms of a learning model with three phases: forethought, performance and self-reflection.

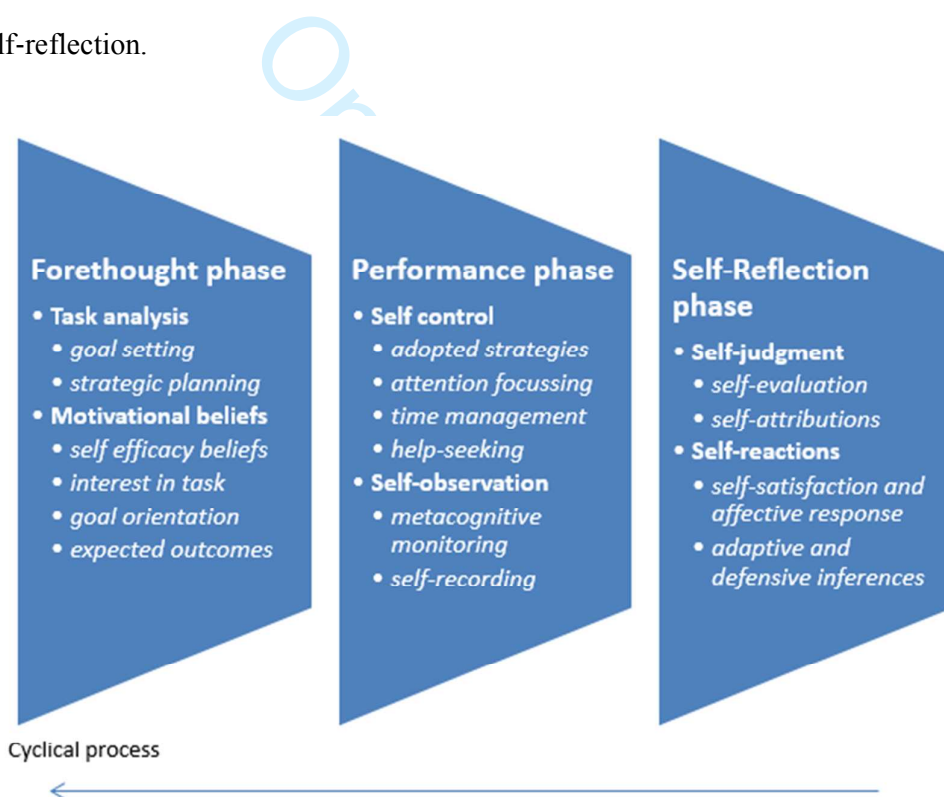


Figure 1. After Zimmerman's (2008) model of SRL phases.

The appeal of Zimmerman's model is that it provides a conceptual framework within which to envisage the learning sub-processes involved in learning, and in doing, help us to analyse students' behaviours. So, for example, planning what to download, copy or read could be viewed as being part of Zimmerman's forethought phase, whereas highlighting material could be regarded as part of a learning strategy.

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3 Virtanen, Nevgi and Niemi (2013: 21) report ‘evidence suggests that quite a number of HE
4 students lack self-regulated learning skills’ [Moreover] ‘little comparative research has been
5 conducted on the use of SRL in the online learning environment to determine whether these
6 strategies are of equivalent use’. Boekaerts (1999: 453) argued that ‘many researchers and
7 educators do not realise there is a bi-directional relationship between learning environment
8 and SRL’ and, as such, the mastery of learning technology is a key component within the
9 learning process. It is clear that Boekaerts (1999) conceptualised learning is as a dynamic
10 state of interaction and mutual reinforcement between the student and their environment.
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12 Moreover, as Broadbent and Poon (2015) recognise:
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23 Online students are required to be more independent, as the very nature of
24 online settings promotes self-directed learning. It is therefore particularly important
25 that online learners compared to their traditional classroom peers, have the self-
26 generated ability to control, manage, and plan their learning actions.
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30 The 2013 ECAR report into undergraduates’ use of information technology highlighted the
31 principal weakness in many e-book platforms, in that they did not provide sufficient
32 personalisation of the learning process. Furthermore, a significant body of research from
33 outside the United Kingdom (UK) suggests that e-textbooks have no discernible impact on
34 students’ performance compared with traditional textbooks (Daniel and Woody, 2013; Morris
35 and Lambe, 2017), although Tang and Barnett-Ellis (2017) argue that e-textbooks do have a
36 positive effect on students’ engagement, and ultimately on their level of attainment.
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51 ***Improving the quality of learning- a research-rich approach based on information***
52 ***technology:***
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3 A number of case studies in the UK had pointed to the potential benefits of 'K' for
4 undergraduate students. For example, Anglia Ruskin University reported that 94% of
5 students valued the platform highly, (Anglia University, 2018), and Middlesex University
6 indicated that 95% of its students rated the resource as good or excellent (Middlesex
7 University, 2018). Although the University claims to have one of the largest libraries in the
8 (UK), and a diverse collection of e-books and e-journals, it was decided to provide a bespoke
9 collection for each student, and which would provide useful data from learning analytics.
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18 Given the emphasis attached to SRL and the principles of andragogic learning, the
19 imperative should be to provide students with choice in what, and how they study. The 'K' e-
20 books platform contains a range of core textbooks that are digitised and that enable students
21 to access resources as they wish and through the medium of their choice. The benefits of an
22 e-books platform are clear: resources are accessible and can be modified in a number of ways
23 to suit the particular learning preferences of the learner. In an age when accessibility and
24 multi-functionality with other technology is perhaps as important as ever for learners, e-book
25 platforms provide a greater convenience than traditional textbooks (Cassidy, Martinez and
26 Shen, 2012). The intention was that students could use their e-book as an accessible core
27 textbook in a variety of formats. The facility to access textbooks by smartphone is a key
28 strength of e-book platforms such as 'K', as students wish to access resources when
29 convenient to them. 'K' is made available to students through a range of devices, including
30 Windows-based and Apple computers, as well as tablets and most importantly smartphones
31 in accordance with the ideas of 'm-learning' (Gu, Wu and Xu, 2015; Morris and Lambe,
32 2017). This versatility was anticipated to improve the learning experience for students, as it
33 encouraged students' self-regulated learning and ownership of the learning process.
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54 The functions provided by the 'K' platform enable students to choose what they read and
55 in their preferred format. For example, students may download an entire text if they wish,
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3 download a number of pages or just highlight some text and copy and paste into their notes,
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5 as well as enabling students to place ‘bookmarks’ in specific parts of the textbook as
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7 reminders. In short, ‘K’ enables students to customise a textbook into the format that suits
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9 their approach to learning and make it available instantly across a range of electronic devices.
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11 This control over their learning corresponds with the theory of SRL and the educational goals
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13 that underpin andragogy.
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16 The main challenge involved in rolling out new technology often relates to resistance from
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18 academic staff or students. In a discussion of how the Technology Acceptance Model (TAM)
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20 can provide an insight into this issue, Jin (2014) identified students’ self-efficacy, perceived
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22 advantage, as well as prevalent social norms were important factors in the success of a new
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24 project. Jin (2014) validates Davis’ Technological Acceptance Model (TAM), which
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26 identified the two principal factors in determining take-up as being perceived usefulness and
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28 perceived ease of use (Davis, 1989; Venkatesh, Morris, Davis and Davis, 2003). Since self-
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30 efficacy and task analysis/value are important sub-processes within SRL theory, there is
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32 significant potential to explore the connections between SRL and TAM in future research.
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53 **Research methodology:**
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3 The research methodology adopted three approaches. The first, sought feedback from
4 students via a questionnaire on how they viewed 'K' as a learning resource. The
5 questionnaire involved eight prompting statements, each associated with a five-point Likert
6 scale. This approach proved problematic, with a poor response rate of 15%. This lack of
7 participation in university-generated quality audits was evident elsewhere, most notably
8 through low-participation in module surveys. Prevailing deference to their local tutors and
9 their ASC meant that students were reluctant to become involved.
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18 The second research method was to undertake a web survey of research undertaken into e-
19 textbooks (Gu, Wu and Xu, 2015) and its wider professional context (Tang and Barnett-Ellis,
20 2017). In particular, a number of case studies of universities in the UK were studied. This
21 enabled some comparison to be drawn between institutional strategies and outcomes. A third
22 research approach involved the interrogation of the data generated by the 'K' textbook
23 platform itself. The platform categorises student interaction into distinct data sets, such as
24 downloads, pages viewed and copy/paste functions that may be used to make some inferences
25 about students' learning behaviours. The figures presented below are screen shots of the
26 information generated and provide an insight into the nature of students' behaviours.
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55 **Findings and discussion**

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The data generated by the research questionnaire is presented in figure 2.

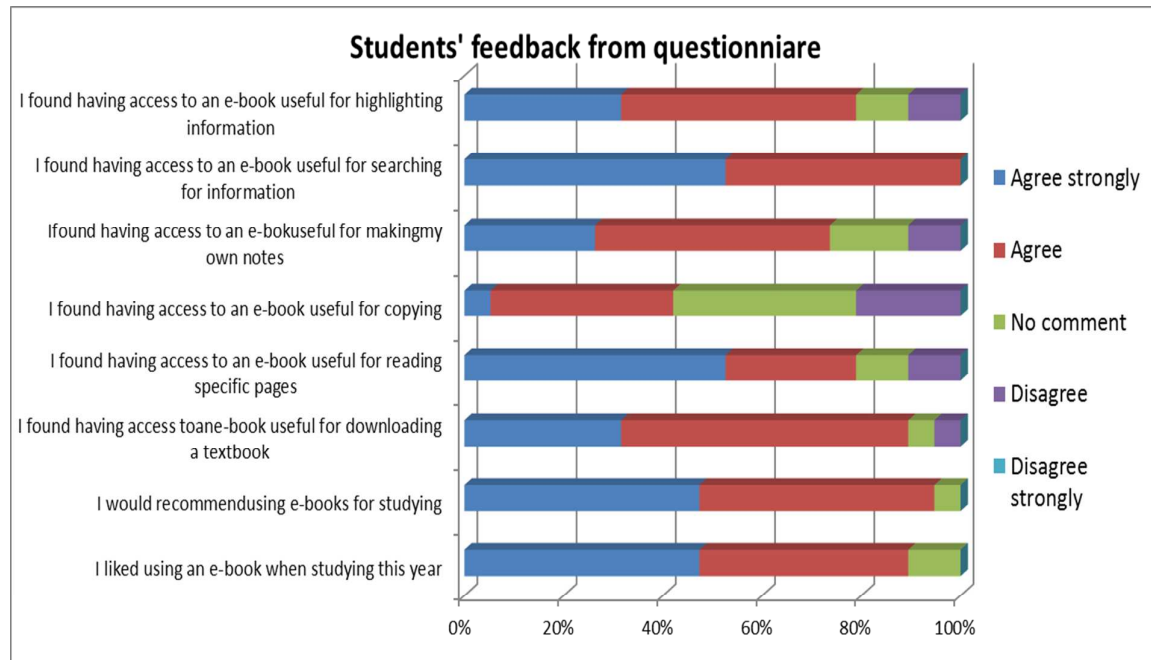


Figure 2. The data generated from the questionnaire to students.

The data provided some rudimentary, but nevertheless interesting findings. In general, the feedback was very positive. The most positive feedback related to the search function of the platform, with no criticism of its functionality. This was followed closely with a positive recommendation for its adoption by other students, and an indication that students had liked using the resource. Students were less happy with using 'K' in order to copy and paste material and as a help in making own notes.

How may learning analytics provide a better insight into student interaction with their learning resources?

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3 The data derived from students' use of the e-book platform provided a new insight into how
4 students interact with their learning resources. One of the key merits of the 'K' platform is
5 the range of data as key performance indicators (KPIs) that it provides to both online teachers
6 and programme managers. For Wilson et al. (2017, 998), all too often 'purely social models
7 of learning rather neglect an important part of students' learning: the material or non-
8 human.... Here a sociomaterial perspective which recognises the role of the material, would
9 encourage us to take account of... the devices used by students and the platforms through
10 which courses and modules are delivered'. For example, Figure 3 shows when students
11 accessed their textbook during February to April 2017 to download specific pages. Figure 3
12 also shows the peak date for this activity, namely 5-7th March, as well as when no pages were
13 downloaded, namely 12th February and around 24-25th March. Figure 4 indicates that a
14 significant number of students downloaded a text during the second week of the module.
15 Interestingly, around 5th March, there were very few downloads of textbooks whereas the
16 largest number of pages viewed took place at that time. Taking into account both Figure 3
17 and Figure 4, it would appear that although a number did download their core text relatively
18 early in the module, a number chose to visit or revisit the resource periodically.
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Key Trends

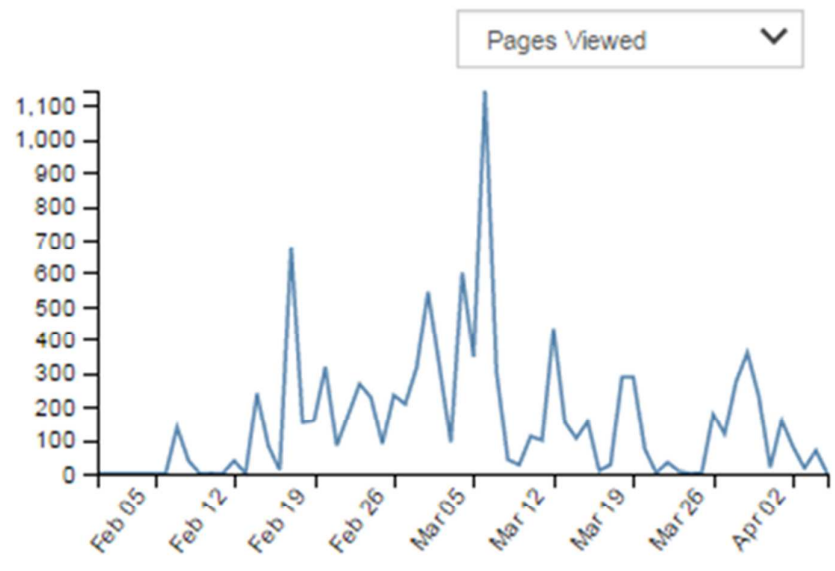


Figure 3. February-April 2017: All modules, all books, all users, pages viewed.

Key Trends

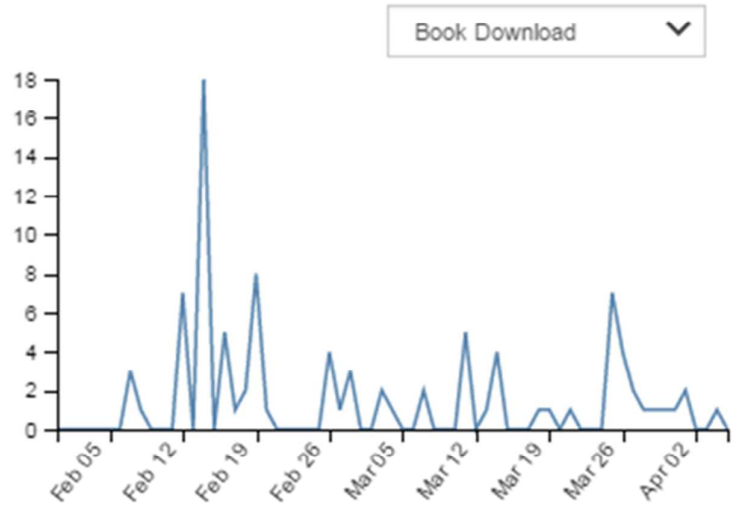


Figure 4. February-April 2017: All modules, all books, all users, book downloads

Figures 5 and 6 provide further information on students' behaviours in relation to their searching for information, printing, bookmarking and copying pages suggesting that they adopt different behaviours at different junctures within their learning journey. In particular, there appears to be distinct peaks in searching and printing or resources during mid-March. This finding echoes the research into 'temporal modelling' of students' learning (Cheng, Liu, Sun, Liu and Yang, 2017) that suggests that students access different types of information at different times for different reasons, and that we should be aware of this when supporting students. These graphs infer that student adopt specific behaviours that reflect their particular position within Zimmerman's three phase learning cycle.

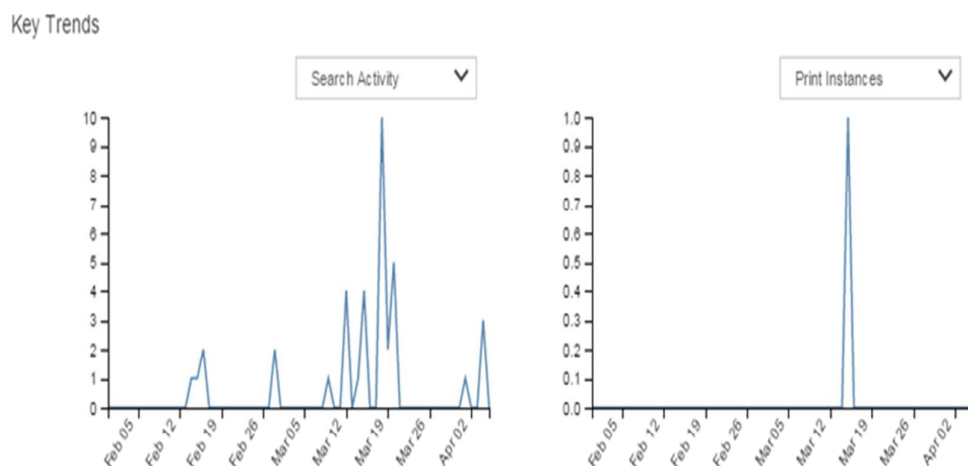


Figure 5. February-April 2017: All modules, all books, all users, search activity, print instances

Key Trends

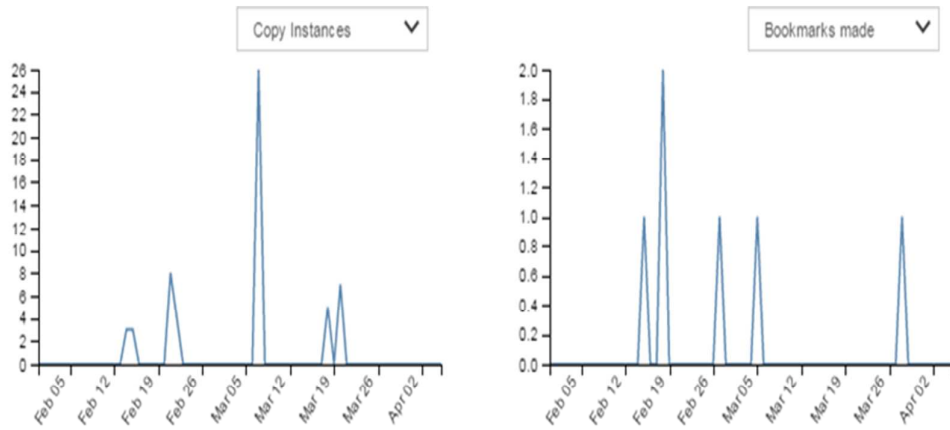


Figure 6. February-April 2017: All modules, all books, all users, copy instances and bookmarks made

Key Trends

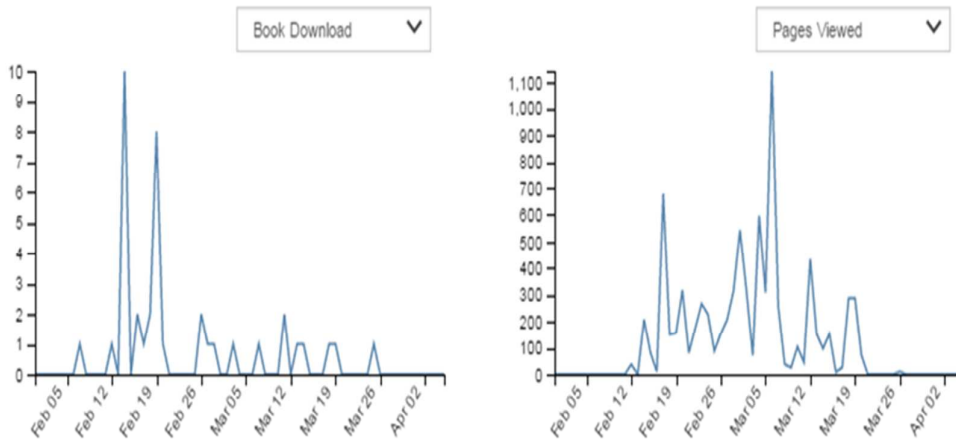


Figure 7. Book downloads and pages viewed for the Leadership module.

Key Trends

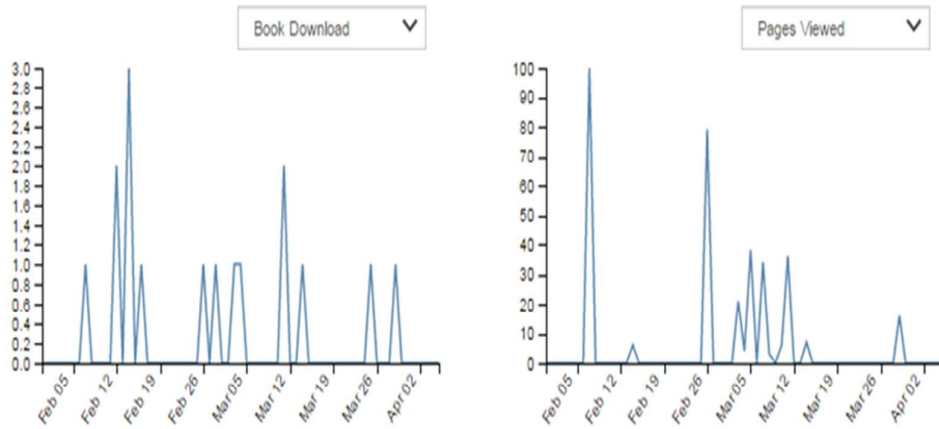


Figure 8. Books downloaded and pages viewed for the Human Resource Management module.

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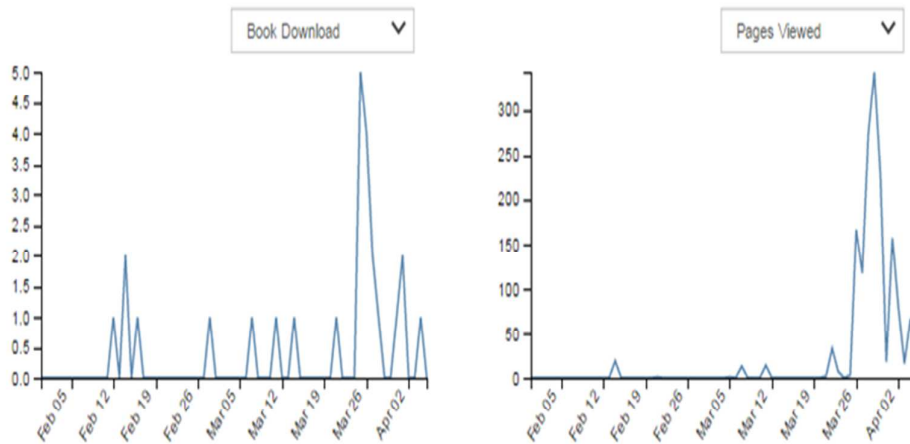


Figure 9. Books downloaded and pages viewed for Strategy module.

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3 In addition to providing a global track of students' behaviours, 'K' also provides module-
4 by-module comparison. As can be seen with reference to Figures 7, 8 and 9, there are
5 significant variations on the way students have interacted with each module. Although there
6 is some similarity between the data generated by the Leadership and Human Resource
7 Management modules, the strategy module reports a significant difference in students'
8 activity. In part, this could be attributed to the scheduling of the modules, or the prioritisation
9 of certain modules over others by students. As a consequence, teachers and their line
10 managers may be better informed in addressing perceived weaknesses in specific modules.
11 Such progress infers action can be directed to specific areas of the curriculum rather than
12 adopt an unfocussed approach.
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28 ***Understanding how teachers may apply learning analytics as a management tool to***
29 ***support students more effectively?***
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32 Wilson et al. (2017, 994) argue that 'the effectiveness of learning analytics in measuring,
33 predicting and improving student performance is... open to question'. This paper offers an
34 alternative perspective on the utility of learning analytics, albeit with recognition of the
35 problems and limitations associated with this practice. The data generated by the 'K' e-
36 textbooks platform provides teachers not only with an understanding of how students interact
37 with their core learning materials but provides early indications of student disengagement,
38 which is another important indicator of course effectiveness. Using learning analytics
39 provides the University with an independent source of data on each student. In doing so, it
40 can identify potential dis-engagement and possible under-performance. This practice of
41 'predictive modelling' is becoming increasingly common in Higher Education. Acting upon
42 such data enables teachers to devise intervention strategies to re-engage and support students
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as reported in the literature (Chiang, Yang and Hwang, 2014). For example, as a result of using ‘K’ data, it is now possible to contact partner study centres and advise them about a student’s dis-engagement, or emails can be sent directly to students offering support. Instead of being a recipient of information, the Business School is a generator of useful data that can impact of students’ progress.

In providing a resource that is accessible via smart phones, iPad and laptops, the platform enables students to engage with the learning materials when it suits them, using the technology of their choice. This recognition of students’ preferred ways of interacting with technology chimes with andragogy and research on self-regulated learning that report higher levels of persistence, deeper learning and higher levels of learner satisfaction (Joo, Joung and Kim, 2014; Liaw and Huang, 2016). This research suggests that all three phases of Zimmerman’s SRL learning cycle are involved in the use of e-textbooks. In defining what is of interest, what should be read and what effort is required to attain a certain learning goal, a student is engaging in the forethought phase of Zimmerman’s model. It is clear that e-textbooks provide an insight into the processes involved when a student exercises control over their learning. Table 1 provides a summary of how this modelling of e-textbooks within a SRL conceptual framework could be interpreted.

Activity	SRL sub-process	SRL phase
Searching for keywords	Learning task strategy	Forethought phase
Identifying what should be read in depth	Strategic planning	Forethought phase
Organising the reading, copying and highlighting of text	Learning task strategies	Performance phase
Reflecting on how best to use the e-textbook to improve learning	Metacognitive monitoring	Performance phase
Reviewing the effectiveness of a student’s research strategy	Self-evaluation	Self-reflection phase
Reviewing the functionality and usage of an e-textbook	Causal attribution	Self-reflection phase

Table 1. A summary of how the use of e-textbooks could be aligned with SRL theory.

Conclusion:

Gu, Wu and Xu (2015) claim that research on e-books has tended to focus on their acceptance and the perception of users, as well as the comparison with traditional textbooks. This paper offers a new way of viewing e-textbooks by aligning their use within the SRL conceptual framework, and placing this model within the wider discourse on life-long learning. The findings from this study reinforce research elsewhere that reports on the perceived benefits of the search function for students, and that students generally view e-textbooks as complementary to other forms of learning resource (Tang and Barnet-Ellis, 2017).

All these platforms are variations on two common themes: to provide students with accessible learning materials and teachers with data on its usage. In this respect, the 'K' platform is not new nor unique. This paper does not claim that e-textbooks automatically produce improved performance, which echo research elsewhere (Gu, Wu and Xu, 2015). The use of e-books can be only one of numerous actions that can be taken together to improve the experience of learning and students' attainment. E-textbook platforms do, however, promise greater student autonomy and accessibility to learning materials. As Higher Education moves from the conventional lecture to more diversified forms of learning, e-textbooks will complement this paradigm shift away from the transmission of content to the empowerment of independent learning.

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On The Horizon