Perceived learning outcomes from Moodle:
An empirical study of intrinsic and extrinsic motivating factors

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Abstract
This study explores the intrinsic and extrinsic features of Moodle learning managements system and how these features motivate students to use an e-learning portal, which subsequently influences their perceived learning effectiveness and academic performance. Theoretical underpinning of motivation theory, self-determination theory (SDT), and cognitive evaluation theory (CET) is used to design the framework. The quantitative empirical research to test the hypothesized relationships was conducted on 276 online students in Pakistan who use Moodle for online learning. By analysing the responses using AMOS, the findings reveal that both the intrinsic motivators (communication module features, course content module features and course delivery module features) and extrinsic motivator (assignment module feature) significantly influence the students’ perceived learning effectiveness, which results in improve academic performance.

Keywords
learning management systems, Moodle, student motivation, learning effectiveness, Pakistan

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The enhanced modules of the Moodle platform help students to improve their learning experience.

Introduction
The dynamic utilization of the Internet has shifted educational methodology from a traditional to a virtual environment. Digital media enrich the experience of learning and teaching and have become a common learning environment for both students and teachers (Liaw et al., 2007; Chin-Roemer et al., 2011). Students can electronically communicate with other students and teachers can use digital media such as chat sessions, discussion forums and email.

For the last 10 years, joint efforts have been made by universities to implement e-learning as a new learning paradigm. The initiatives in this field have given fruitful results in the form of dynamic course development and ease of learning for distant students (Pflichter, 2006). The technological advancement in the educational field is facilitated through learning management systems (LMS) like BigBlueButton,
Desire2Learn, Sakai, WizIQ and Moodle (Modular Object-Oriented Dynamic Learning Environment), etc. (Alexander and Golja, 2007; Nyagowa et al., 2013). Different studies on the use of learning management systems for online courses have reported positive learning performance outcomes (McGill and Klobas, 2009; Novo-Corti et al., 2013). Satisfaction from e-learning, influence of intrinsic and extrinsic motivators on behavioural intention in e-learning, users' behaviour towards e-learning, quality in e-learning and the impact of learning management systems interfaces are the topics of many studies (Al Musawi et al., 2012; Waheed and Kaur, 2014; Alexander and Golja, 2007; Paechter et al., 2010; Yoo et al., 2012). However, a lack of interest is seen towards learning management systems modules' features as motivational factors and how these factors influence student learning outcomes.

A few studies have explored the factors affecting perceived learning, but most of them have been conducted in a collaborative learning context (Arbaugh and Benbunan-Fich, 2007; Benbunan-Fich and Hiltz, 2003). Yoo et al. (2012) discuss e-learning portal features as intrinsic and extrinsic motivators that influence employees' intention to use learning management systems in the workplace environment. However, learning effectiveness and academic performance of students in the presence of motivational factors, either intrinsic or extrinsic, also need significant attention.

In Self-Determination Theory, Deci and Ryan (1985) explain intrinsic and extrinsic motivation as two key types of motivation based on different activities that lead to action. Communication with peers, relatedness and autonomy stimulate intrinsic motivation, while external benefits, facilities and rewards excite extrinsic motivation (Ryan and Deci, 2000a). In a similar study, Wan et al. (2008) evaluate the influence of physiological processes on e-learning outcomes. Motivation as a key factor for successful e-learning portals (Jones and Issroff, 2005) demands detailed understanding of different features within learning management systems and their intrinsic or extrinsic nature.

To fill this gap in the literature, this study considers the frequently used learning management system Moodle, because of its popularity (Al-Ajlan and Zedan, 2008), high rating and large number of active courses in different languages (Cole and Foster, 2007; Moodle, 2015). To study the nature of various features of Moodle, the most used features of learning management systems are considered in four categories, namely, Communication Module (CM), Assignment Module (AM), Course Content Module (CCM) and Course Delivery Module (CDM). This study considers these features as intrinsic and extrinsic motivators and identifies their influence on student motivation to use an e-learning portal and its subsequent effect on students’ perceived learning effectiveness and academic performance. This study contributes to the development and testing of a successful learning management system model that incorporates module features, motivators and predictors of academic performance.

**Literature review and research framework**

Facilities of new digital media integration (presentation features) that significantly influence the users' motivation (Berry, 2005) include flexible learning medium, adequate amount of quality information provided by field experts (Cole and Foster, 2007; Dougiamas, 2004; Wharekura-Tini and Aotearoa, 2004) and secure login feature with data privacy (Brandl, 2005; Zenha-Rela and Carvalho, 2006). Many researchers have reported improved learning or academic performance by students using Moodle in academic institutions (McGill and Klobas, 2009; Novo-Corti et al., 2013).

Motivation theory explains the influential role of intrinsic and extrinsic motivators to excite user motivation in task performance (Ryan and Deci, 2000a). “Intrinsically motivated behaviors are engaged in for their own sake, for the pleasure and satisfaction derived from the process of engaging in the activity” (Hassandra et al., 2003: 212). Studies have shown that students taking online courses are more motivated intrinsically than on-campus students due to various interactive activities and communication with peers across the globe (Hartnett et al., 2011). Facilities or rewards provided to individuals to raise their motivational level for a particular task are considered as extrinsic motivating factors (Ryan and Deci, 2000b; Suslu, 2006).

Review of motivational aspects in an online context reveals adequate attention to designing motivational learning environments (ChanLin, 2009; Keller, 2008), identifying motivational traits (Wighting et al., 2008; Yükseltürk and Bulut, 2007) and comparison of intrinsic motivators for online and face-to-face students (Rovai et al., 2007; Shroff and Vogel, 2009; Wighting et al., 2008). However, there is a lack of focus in the literature on the nature and influence of various Moodle features on learning outcomes. This
study tries to fill this gap by explaining Moodle features, their intrinsic or extrinsic nature and their influence on students’ perceived learning effectiveness and academic performance.

**Module features as intrinsic motivators**

**Communication Module features.** The Communication Module involves liaison between students or between student and teacher through discussion forums and live chat sessions. Regular communication maintains a social and learning association. This helps in knowledge creation and motivates students to learn and explore the system in a better way. Information exchange among students and teachers about educational content and daily life learning activities are important for learning (Chang and Tung, 2008; Johnson et al., 2008; Paechter and Schweizer, 2006; Richardson and Swan, 2003). Timely responses by teachers stimulate the students’ motivation to work and to engage in other learning activities available in the online portal (Brophy, 1999). Discussion forums help in building constructive learning environments (Singh, 2010). According to SDT, intrinsic motivation emphasizes the social and environmental factors that elicit this type of motivation (Deci and Ryan, 1985). Research shows that positive feedback enhances intrinsic motivation, while negative feedback diminishes it (Ryan and Deci, 2000a). Cognitive Evaluation Theory (CET), as a sub-theory of SDT, explains factors like interpersonal events (e.g. communication and feedback) and structures as key stimuli for variable intrinsic motivation (Deci, 1980).

According to SDT and CET, the Communication Module holds key characteristics of intrinsic motivation. The facility of the group work environment for the exchange of course-related knowledge enhances understanding of the topic (Ayybay and Dag, 2003). Communication through chat sessions and discussion forums with other students and teachers open new dimensions and thinking patterns. This pattern intrinsically motivates the students to be involved in a diverse learning environment. This constructive learning environment helps the students to build up a useful learning repository (Brophy, 1999; Jucks et al., 2003). Active participation in teamwork motivates the students to engage more in the learning environment (Concannon et al., 2005; Paechter et al., 2010).

As a part of active communication, interactive text-based chat that includes live presentation is an interesting way of communication (Skelton, 2009), which motivates the students intrinsically to participate in an active learning process through collaborative learning, rather than studying alone. Group communication, chat sessions, and teacher’s feedback motivate students intrinsically to participate in interactive learning activities. The above discussion leads to the following postulation for this study.

**Hypothesis 1:** Communication Module features intrinsically motivate students to use the e-learning portal.

**Course Content Module features.** The relevancy and innovativeness of the content are essential for productive learning. The Course Content Module has course content compilation features, which are useful for current and future students (Singh, 2010). Updated course outlines and contents are sources of attraction for students, which involve them in a regular learning process (Brophy, 1999).

In a good portal, published books, research papers, relevant web links and lecture slides are available on a weekly basis. Quality content fulfils the students’ learning needs and motivates them to interact with the online portal for improved learning (Chang and Tung, 2008; Shee and Wang, 2008) and performance during assessment (Lee and Lee, 2008).

The above discussion confirms the concept of learning theory (Hull, 1943). This affirms that physiological drivers or their derivatives motivate certain type of behaviour. Intrinsically motivating activities fulfil the innate psychological needs (Ryan and Deci, 2000a). Teachers’ positive attitudes play an active role in creating quality content (Waheed and Jam, 2010). The Moodle course content compilation feature helps in building course hand-outs, which are the essential need of students. Fulfilment of such needs intrinsically motivates students to use the course contents. The following hypothesis is proposed in the light of the above discussion:

**Hypothesis 2:** The Course Content Module features intrinsically motivate student to use the e-learning portal.

**Course Delivery Module features.** The medium of course delivery is one of the important factors for distant users. The Course Delivery Module features involve ease of access and learning autonomy at flexible times and spaces (Alparslan et al., 2008). It does not restrict the students to studying within a physical boundary. Autonomy of learning and teaching helps deliver the
best performance from both sides. Students are free to attend their classes from any part of the world using a simple Internet connection (Skelton, 2009).

Cognitive Evaluation Theory (CET) asserts that the sense of autonomy results in enhanced intrinsic motivation (Ryan, 1982). In traditional learning environments, students with more autonomy-supportive environments show greater intrinsic motivation and desire for learning. Students lose their interest in overly controlled environments.

From an e-learning perspective, the Moodle feature of learning autonomy at flexible times and spaces can be considered as an intrinsic motivator for students. The Moodle platform provides the sense of autonomy and promotes student-centered learning. The security feature allows only registered students to take classes and see the course content. This ensures secure and unique content delivery that provides psychological satisfaction and intrinsic motivation (Ryan and Deci, 2000b). The flexible user-friendly interface and easy access features of the module motivate students to use the e-learning portal. This discussion leads to the following hypothesis:

**Hypothesis 3:** The Course Delivery Module features intrinsically motivate students to use the e-learning portal.

**Module features as extrinsic motivators**

**Assignment Module features.** Student evaluation and grading are the main requirements for any educational system. The assignment module provides friendly features for both students and teachers. Without going into the trouble of printing (by students) and handling the prints for grading (by teachers), online submission and grading is advantageous. The students are able to save time and resources consumed on printing and binding (Singh, 2010); also the teachers get relief from the burden of printed assignments. The authenticated login system and assignment module’s security restrict assignment mirroring which helps in fair evaluation (Berry, 2005). The rewards and physical facilities provided to complete a certain task are considered as extrinsic motivators (Suslu, 2006). From the school teachers’ perspective, inadequate facilities negatively impact their motivation to work (Kocabas, 2009).

In an e-learning perspective, the Moodle assignment module provides the assignment submission and grading facility (Aydıny, 2003), which is regarded as one of the key extrinsic motivators for students. The assignment questions developed by a course teacher are uploaded and students are required to submit their completed assignments through their login within the deadline. Online grade checking and teachers’ feedback save the students’ time and help them to improve their performance for future assignments. All of the above features extrinsically motivate the students.

The above discussion leads to the following hypothesis:

**Hypothesis 4:** The assignment module features extrinsically motivate students to use e-learning portal.

**Module features as motivation predictors**

Motivation is the degree of persistent effort one has for achieving one’s goal (Johns, 1996); similarly, learning motivation is achieved by applying persistent effort to learning (Amabile et al., 1994; Deci, 1980; Ryan and Deci, 2000b).

Learning and motivation are two multifaceted human behaviors. The students learn from their experiences, whereas some motivational factors enhance their willingness to learn. Research has confirmed the significant relationship between learning and motivational factors in higher education (Jenkins, 2001; Lynch, 2006).

The continuous learning intention and academic success of students are linked to their level of motivation (Law et al., 2010; Linnenbrink and Pintrich, 2002; Lynch, 2006). Motivations are distributed across positive and negative directions that influence an individual’s behaviors either intrinsically or extrinsically. Figure 1 presents positive and negative aspects of extrinsic and intrinsic motivation in Moodle context (Norton, 2009; Trivedi, 2013). The students’ active participation in different types of communication activities like playing an active role in discussion forums and continuous liaison with teachers demonstrate their motivation to use the portal (De Vicente and Pain, 2002; Stathacopoulou et al., 2004). Activities introduced during the course and relevant information sharing motivates the student to continuously use the modules for more information gathering and learning (Munoz-Organero et al., 2010, Ishtaiwa, 2011).

**Motivation as a predictor of student learning outcomes**

From the perspective of affective outcomes, students’ perceived learning effectiveness is considered as a key learning outcome and a significant relationship
is reported between motivation and perceived learning effectiveness in a course taught through Moodle platform (Ai-Lim Lee et al., 2010). The learning outcome in terms of students’ improved academic performance in a technology mediated learning environment is confirmed by McGill and Klobas (2009). Alavi and Leidner (2001) found a strong relationship between motivation and learning outcomes. The socio-emotional and intellectual benefits of collaborative learning result in better and more effective learning outcomes as compared to individual learning. The students are more motivated to participate in group discussions with people from different parts of the world and as a result demonstrate better academic performance (Benbunan-Fich and Hiltz, 2003). Perceived learning effectiveness is a kind of perception in which students have forethought that the use of learning management system will impact on their learning and they will achieve better outcomes. (McGill and Klobas, 2009). Novo-Corti et al. (2013) discuss this effective learning - outcomes (grades) relationship and reported the significant influence of learning effectiveness on students’ grades. If students believe that the use of course material from Moodle has improved their understanding and required learning is achieved they perceive it as an effective online learning environment. If students’ perception based on their usage of Moodle acts in this way, then it will positively influence their academic performance. Thus in this study, perceived learning effectiveness is proposed as a predictor of academic performance. It is therefore hypothesized that

**Hypothesis 5:** Students’ motivation to use e-learning portal influences the students’ perceived learning effectiveness.

**Hypothesis 6:** Students’ perceived learning effectiveness influences their academic performance.

### Research model

Considering the theoretical underpinning of motivation theory, self-determination theory, and cognitive evaluation theory, the proposed research model incorporates the major Moodle module features as intrinsic and extrinsic motivators. These are expected to be relevant predictors of student motivation to use an e-learning portal, which influence students’ perceived learning effectiveness and academic performance. The research model in Figure 2 depicts the Communication Module, Course Content Module and Course Delivery Module as intrinsic motivators, while the Assignment Module is an extrinsic motivator, which influences student motivation. Subsequently, students’ motivation to use an e-learning portal predicts perceived learning effectiveness and academic performance positively. The associated hypothesized paths are also presented in the model.

### Research methodology

The data was collected from students of a public sector university in Pakistan. Allama Iqbal Open University, being a founder of distance education in Pakistan, has 36 regional campuses and centres all over the country that provide distance education through radio, television and online media to deliver lectures. This study focuses on the online media used for delivering education through an online program named as Open Learning Institute of Virtual Education (OLIVE). Undergraduate and postgraduate students who were using online mode of education for their classes and were taking advantage of Moodle as a learning technology for Business, Management and Computer classes were the target population of the study.

A web-based closed-ended questionnaire was used to obtain responses from the target sample of 800 online students, who are living in remote areas. A
survey website was designed specifically for this study, with a user-friendly interface to increase the response rate. An email explaining the research objectives, confidentiality of responses and a web-based survey link was sent to online students. To increase the survey credibility, the official email address of the OLIVE administrator was used. A total of 350 questionnaires were received, of which 276 (78.9%) were useable. The overall response rate was 34.5%. Data was manually entered in SPSS 20 and checked twice for error and omissions. Table 1 summarizes the characteristics of the respondents.

**Measures**

Measurement items were extracted from prior validated research instruments. The Web-based Learning Environment Instrument developed by Chang and Fisher (2003) was adapted to administer the Communication Module Features, Assignment Module Features, Course Content Module Features and Course Delivery Module Features. For measuring the students’ motivation items, the Academic Motivation scale was adapted from Vallerand et al. (1992). Items of perceived learning effectiveness (PLE) have been adopted from Wan et al. (2008), while students’ grades are evaluated through academic performance (AP) construct and items are extracted from Lee and Lee (2008). The instrument is measured on a 5-point Likert scale ranging from strongly agree (1) to strongly disagree (5). This ‘Moodle Module Survey (MMS)’ helps in understanding the Moodle features from the student perspective, and is a significant addition to the literature.

**Results and discussion**

**Validity and reliability**

The validity and reliability of the constructs was tested to ensure measurement accuracy and soundness.

Validities were confirmed through convergent and discriminant validity using factor analysis. Convergent validity indicates each item’s factor loading and Average Variance Extracted (AVE) values. Loading of each item is above the benchmark of 0.505 (Falk and Miller, 1992) with zero cross loadings (>0.5), as shown in the factor analysis in Table 2. Table 3 presents the AVE values for each of the employed
### Table 2. Factor Loading and Alpha Reliabilities.

<table>
<thead>
<tr>
<th>Items</th>
<th>Cronbach Alpha</th>
<th>Item Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication Module Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The facility of email and regular online chat sessions helps in my learning.</td>
<td>.90</td>
<td>.80</td>
</tr>
<tr>
<td>I can easily get in contact with instructor via email, chat, and forum.</td>
<td>.73</td>
<td></td>
</tr>
<tr>
<td>I can exchange knowledge easily and quickly with other course participants via e-mail, chat, newsgroups.</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>Ample opportunities are available to establish personal contact with other participants.</td>
<td>.69</td>
<td></td>
</tr>
<tr>
<td>Online communication tools facilitate establishing new contact with other students.</td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td>Group activities and discussions are encouraged.</td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>Use of online communication tools complicates group work</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>I would find it difficult to study without regular help from Moodle resources.</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>Online resources and class lectures enhances my learning.</td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td>I experience fun, pleasure, and satisfaction using forums and chats to communicate with other student</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td><strong>Assignment Module Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online assignment submission facility saves my time and resources (e.g. Printing cost).</td>
<td>.95</td>
<td>.91</td>
</tr>
<tr>
<td>Facility of uploading multiple documents allows me to design my assignment with better graphs and charts.</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>Option of deleting the mistakenly uploaded file relief me.</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>Assignments are strictly visible to teacher only that gives security of my ideas</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>Online grades checking facility saves my time and resources.</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td><strong>Course Content Module Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expert teachers select the quality course contents</td>
<td>.93</td>
<td>.89</td>
</tr>
<tr>
<td>Course objectives are clearly states in each course</td>
<td></td>
<td>.93</td>
</tr>
<tr>
<td>Online resources are not a substitute for printed ones.</td>
<td></td>
<td>.88</td>
</tr>
<tr>
<td>Structure keeps me focused on what is to be learned.</td>
<td></td>
<td>.89</td>
</tr>
<tr>
<td>I feel happy to print lecture and exercise material from Moodle.</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td><strong>Course Delivery Module Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The learning environment offers opportunities to increase my knowledge and to control my success (e.g., via tests)</td>
<td>.94</td>
<td>.94</td>
</tr>
<tr>
<td>I can decide on my own at what times and where I am learning (e.g., at the university, at home)</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>I can decide on my own about the pace of learning and the use of learning strategies</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>I can use the time saved in travelling and on campus class attendance for study and other commitments.</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td><strong>Student Motivation</strong></td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td>I use online learning environment because I think that this is important to increase my knowledge</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>I just use online learning environment because my activity is recorded and can increase final grade</td>
<td>.74</td>
<td></td>
</tr>
<tr>
<td>I find it difficult to motivate myself and to maintain my learning motivation in the course</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Learning Effectiveness</strong></td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>I learned factual material</td>
<td></td>
<td>.79</td>
</tr>
<tr>
<td>I learned to identify central issues of the course</td>
<td></td>
<td>.81</td>
</tr>
<tr>
<td>I learned to interrelate important issues of the course</td>
<td></td>
<td>.60</td>
</tr>
<tr>
<td>I developed the ability to communicate clearly about the subject</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>I improved my ability to integrate facts and develop</td>
<td></td>
<td>.85</td>
</tr>
<tr>
<td><strong>Academic Performance</strong></td>
<td>.73</td>
<td></td>
</tr>
<tr>
<td>This term’s e-learning course seems to have obtained a good grade</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Compared to off-line courses, this e-learning course has obtained a good grade</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>I anticipate a good grade in this e-learning course</td>
<td></td>
<td>.86</td>
</tr>
</tbody>
</table>
constructs, which are above the threshold value of 0.50 (Fornell and Larcker, 1981) and ranged from 0.51 to 0.87.

Reliabilities were verified through Cronbach coefficient alpha (Cronbach, 1970) and the composite reliabilities coefficient (Werts et al., 1974). The Cronbach alpha values of each construct were within the range of 0.75 to 0.91, that is also above the threshold value of 0.70 (Churchill, 1979) (Table 2). The composite reliabilities for each construct presented in Table 3 range from 0.70 to 0.95, confirming that all the values are above the acceptable benchmark of 0.70 (Gefen et al., 2000; Nunnally, 1978).

Table 4 shows that the discriminant validity among constructs is confirmed, where the AVE square root value (bold values in diagonal) is higher than the correlation between any pair of constructs (Fornell and Larcker, 1981).

Structural model

The hypothesized third-order factor model was tested through structural equation modelling (SEM) with reference to the main effects to confirm its structural fit. The test results of SEM present a good structural fit, having values $\chi^2/df$ (normed chi-square) = 1.2, RMSEA = 0.06, AGFI = 0.92, GFI = 0.96, CFI = 0.92, which are within the acceptable benchmark values defined by Byrne (2010). The path diagram with standardized estimates and statistical significance is displayed in Figure 3, confirming the hypothesized relationships.

The test results for the six hypothesized relationships are summarized in Table 5.

Discussion

The results of this study show that Moodle is used as a facilitating tool by the students living in distant areas; similar results are also noted by Aybay and Dağ (2003). Instead of simply measuring the influence of intrinsic and extrinsic motivators on intention to use e-learning (Yoo et al., 2012), this study successfully investigates the impact of motivational factors (in terms of intrinsic and extrinsic motivators) on student learning outcomes and shows significant results for the hypothesized relationships.

Communication Module features as intrinsic motivators are significantly impacting the students’ motivation to use e-learning ($p < .006$). This supports the first hypothesis, showing that the facilities of regular online chat sessions, positive liaison between students and teachers, group discussions, and the communication tools available in Moodle are very helpful for students’ learning. The students have ample opportunities to communicate with peers and teachers, which intrinsically motivate them to use the portal again (Ryan and Deci, 2000b).

A positive association is found between Course Content Module features and student motivation to use e-learning ($p < .013$). The result supports the second hypothesis, and reveals that the students are satisfied with the course contents uploaded on the portal. The online knowledge resources made available for the students fulfil their psychological needs of learning (Deci, 1980; Ryan and Deci, 2000a), that intrinsically motivate them towards using the e-learning portal. The course structure and contents are according to the needs of the students, which enhance their motivation to use the e-learning portal.

The positive relationship between Course Delivery Module features and student e-learning motivation ($p < .035$) is highly significant. The result favours the third hypothesis, explaining a positive response of the students regarding the delivery module. The sense of autonomy elicits intrinsic motivation among students (Ryan, 1982). The ‘anywhere’ and ‘any time’ learning opportunity makes the portal more attractive for the students. This facility helps enhance the students’ motivation to use the e-learning portal.

The study further confirms a highly significant positive relationship between the Assignment Module features as extrinsic motivators and student motivation to use e-learning ($p < .001$). This result supports the fact that students find it convenient to use the online assignment submission module, which saves their time and resources like printing and travelling costs. The students feel that their assignments are uploaded in a secure portal, where the teacher gives worthwhile feedback. The students are highly satisfied with the online
grade checking facility. The facilities and contentment provided by the module extrinsically motivate the students to use the e-learning portal.

The results are supporting the overall link between motivated students and their learning outcomes in the fifth and sixth hypotheses. The test results are supporting the fifth hypothesis ($\beta = .46, p < .001$) and reveal that the motivated students develop a positive perception about their learning effectiveness from the e-learning portal. Similar results are also reported by Alavi and Leidner (2001) and Benbunan-Fich and Hiltz (2003) and confirm the influence of motivation on learning outcomes. Finally, the study results support
the sixth hypothesis ($\beta = .52, p < .000$) and confirm a significant impact of perceived learning effectiveness on academic performance. Novo-Corti et al. (2013) also report a positive relationship between perceived learning effectiveness and students’ academic performance. In this study, students perceive that the e-learning portal is effective for their learning, which helps them to understand the topic. This positive perception significantly influences student’s academic performance in terms of their grades.

**Conclusion**

Student motivation predictors as intrinsic and extrinsic motivators in e-learning portal are examined in this study. Moodle modules features are explained in terms of intrinsic and extrinsic motivators. Communication Module features, Course Content Module features, and Course Delivery Module features are framed under intrinsic motivators, while Assignment Module features are framed under extrinsic motivators. Intrinsic and extrinsic motivators significantly impact the student motivation to use the e-learning portal, which influence their perceived learning effectiveness and subsequent academic performance. The students are satisfied with the communication tools available on Moodle, which help in social and educational gain and influence their intentions. The content uploaded on the portal with exact relevance to the course and from recent resources intrinsically motivates the students to take advantage of the current and useful knowledge repository. The autonomous learning and easy accessibility feature intrinsically motivates the students to use the e-learning portal for their further education. When the students need not go anywhere to submit their assignments and waste no money on printing, this increases their acceptance and motivation level. It confirms the students’ satisfaction with the facilities provided through Moodle, which trigger the students’ extrinsic motivation.

These intrinsic and extrinsic motivators enhance students’ motivation to use the e-learning portal. The motivated students develop positive perceptions about effective learning from the e-learning portal that in turn help improve their academic performance. The findings of this study have implications for institutions in understanding the features of learning management systems which can act as motivators for the users. The enhanced modules of the Moodle platform are certainly useful for students to improve their learning experience. Future research can explore other dimensions in different cultures and societies. Study of open source learning management systems can also be an extension of the existing debate.

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