**Two-factor authentication- SHU Book Rental**

In order to increase our layer of security, to protect our students when renting a book, we have integrated a two-factor authentication into our system. Once a student is ready to checkout, it prompts the student for verifies it is the student before checking out, it will send a code to the student’s email or text message that contains the code to the student’s phone. Once the student verifies their identity, it will redirect them to the check-out page, then they are able to proceed to checkout and rent the book.

Adding two-factor authentication (2FA SMS or email) to our system increases the security of student's data and will help to determine student’s identity by validating the student using mobile device or computer, by sending a one-time verification **code** to a cell phone number or email. Once the student enters the verification code back in the form, the system comes to know the authorized person received the verification code.

**To** [**Generate a Verification Code**](https://www.twilio.com/docs/sms/tutorials/two-factor-authentication-python-flask?code-sample=code-initialize-twilio-client-generate-and-send-validation-code&code-language=Python&code-sdk-version=default#generate-a-verification-code)

Before final checking out the system needs to generate and send student one-time verification code.  To generate our *verification code* we use (random.randrange) which can take a *range* as an argument. For example, to send them a 6-digit verification code, like 100000 and 999999.

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Once the system generated the code next step is to send the code to student’s email or through SMS with Twilio (Twilio allows software developers to programmatically make and receive phone calls, send and receive text messages, and perform other communication functions using its web service APIs). By using the Twilio library we can easily send the verification code.

**Implementation of Two Factor Authentication:**

When the student receives an SMS or Email with the verification code it's on the code to ensure the given code is valid.

This validation is achieved by comparing the system’s session verification code with the verification code the student inputs on the form.

If the validation was successful, the application allows the user to have access directly to the Checkout page again to proceed on. Otherwise, the application will prompt for the verification code once again.